STEEL
The Metalworking Weekly
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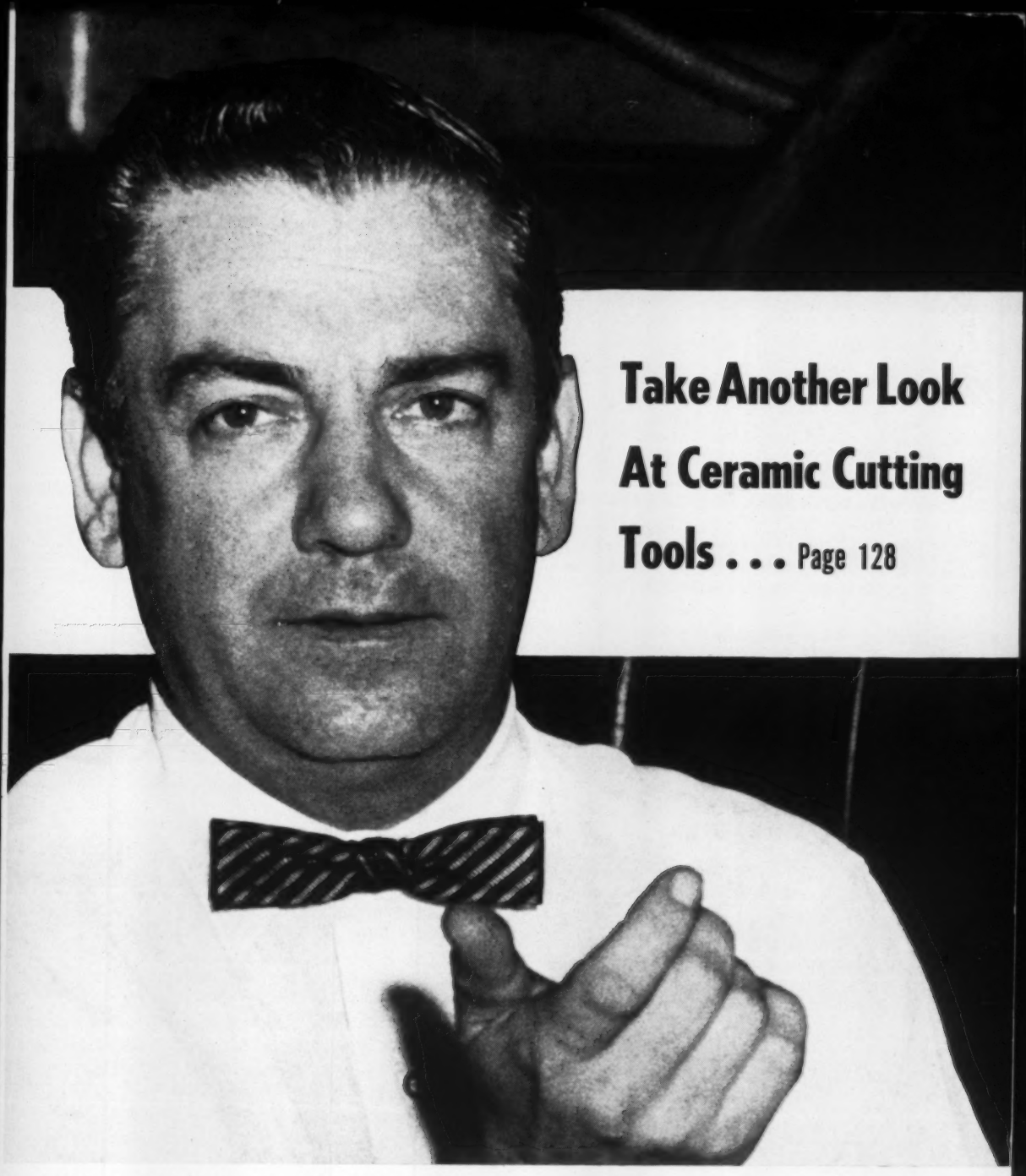

Take Another Look At Ceramic Cutting Tools . . . Page 128

John W. Rodd, ceramics expert, Watervliet Arsenal

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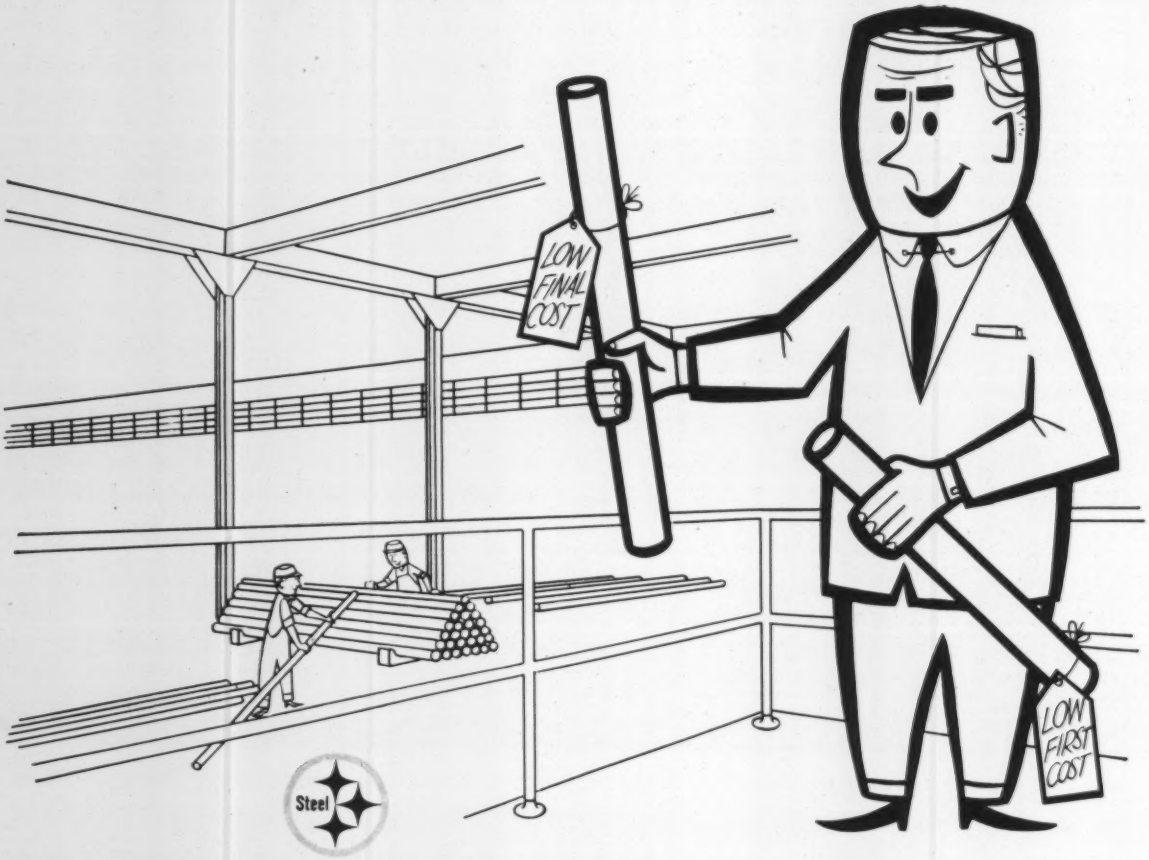

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It takes sheets of steel to make durable metal lath

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But the process of making metal lath is true torture. You feed a 9-inch strip of sheet steel into a machine which cuts slits in it about 1/16 in. apart, then expands the strip into a lattice-like sheet 3 times its original width. Can you imagine any metal other than sheet steel being able to take such treatment, and still retain the "stuff" to stand up to the job?

Bethlehem supplies thousands of tons of sheets to manufacturers of metal lath. Whatever your product, Bethlehem can furnish the sheet steel you need, according to your specifications. And we'll be glad to help you with metallurgical assistance. Just get in touch with our nearest office.

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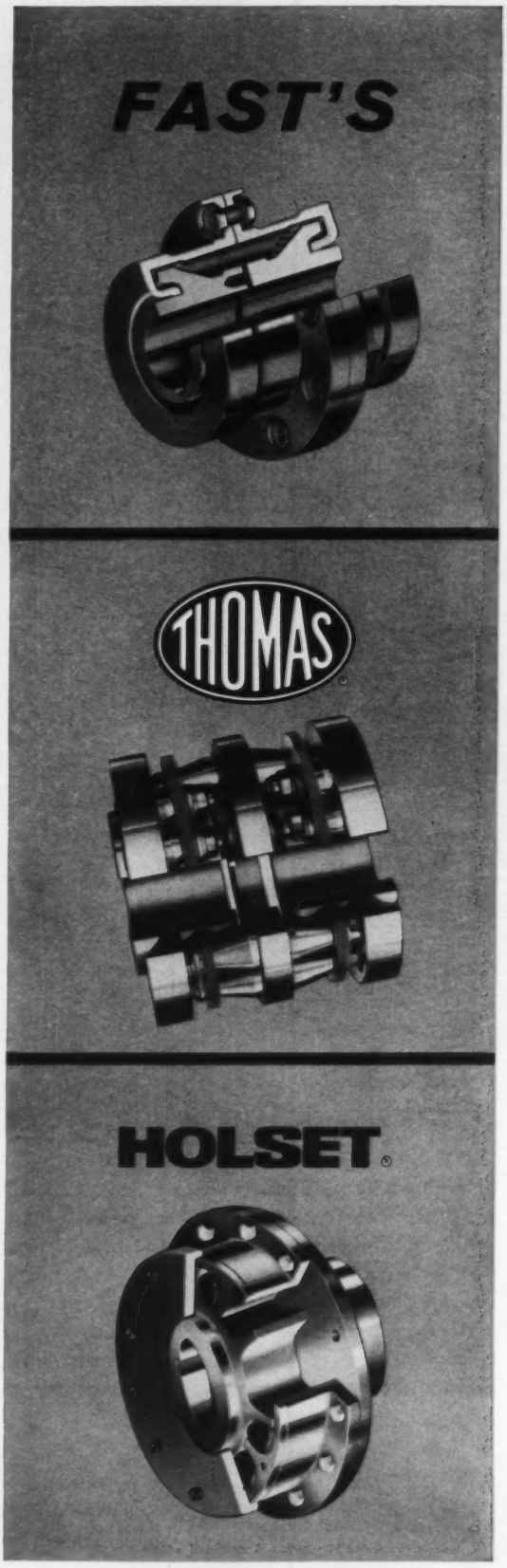

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"Equally important . . . service. Even though we are located on the West Coast, the Ajax Magnethermic service has been second to none."

Gottlob Hinderer, Works Manager
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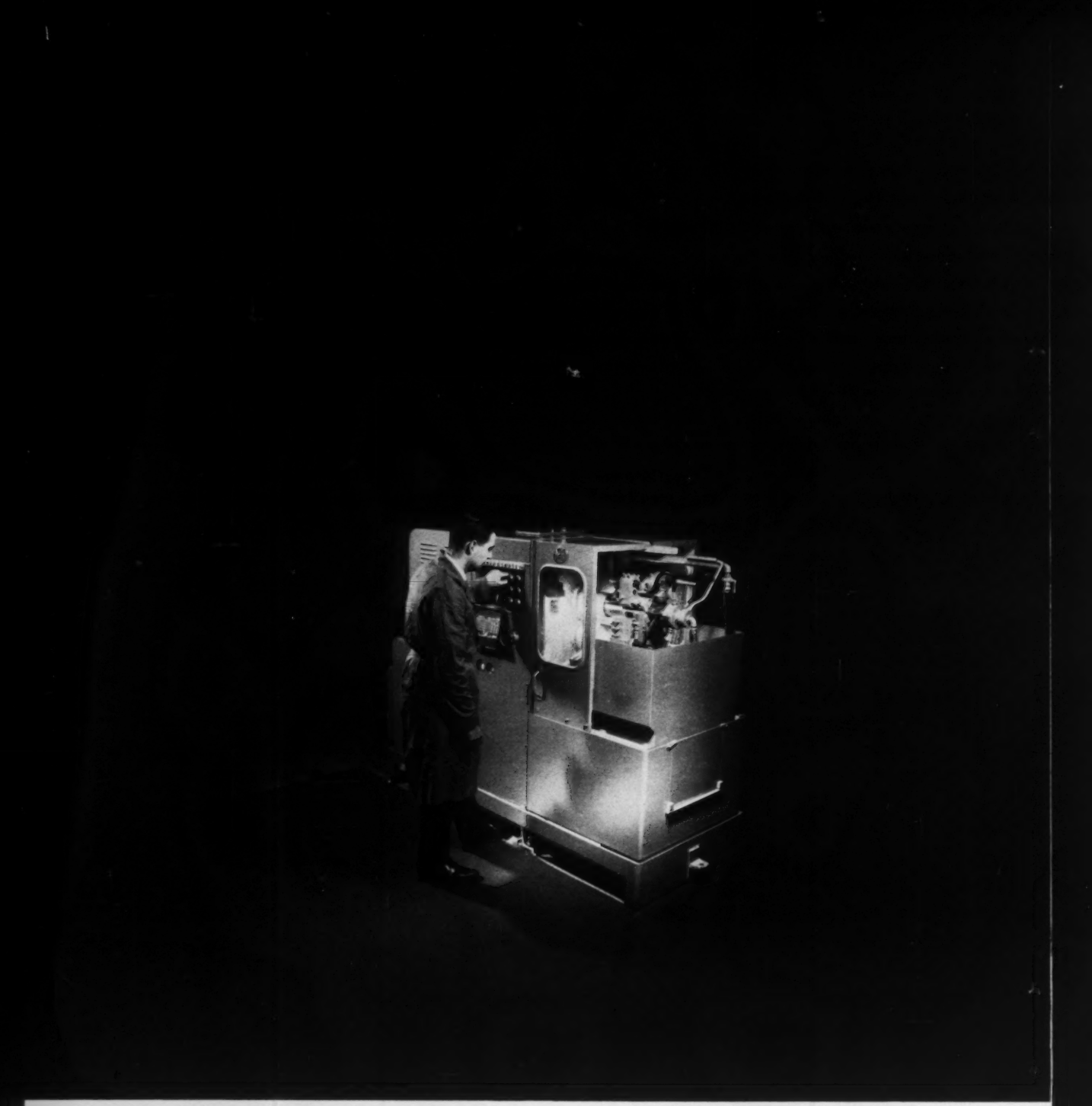

Now you can automate your production of small precision parts with the new O-AC Chucker. Profitable on all lot sizes, it sets up fast like a turret lathe. Easily holds tenths. And one man can operate more than one machine. Contact the Field Engineer from The **Warner & Swasey** Company, Cleveland.

Big Package

Some of the smaller, but still important, items in STEEL, are handled by one of the bigger men on the staff.

Assistant Editor John Teresko is 6 ft 3 in. tall and weighs 230 lb. For examples of his work, see Pages 158 and 159.

Besides handling these, John is the proprietor of the "New Products and Equipment" section, which begins on Page 161.

Before joining STEEL in 1958, John was a technical writer with Automatic Sprinkler Corp. of America. He's a graduate of Youngstown University and has also attended John Carroll University in Cleveland. He's a bachelor and speaks Russian—although there's no connection between the two.

Space Age Mystery

Technicians at a rocket test site were in the countdown. As they neared zero, expectancy heightened. Even their mongrel mascot wiggled his tail nervously.

But zero brought nothing. Blame was placed on the igniter, a wire mesh device shaped like a thermos jug and filled with chemical igniter pellets. Nobody knew why it failed.

Aerojet-General Corp. experts were asked to investigate. They discovered a foreign substance on the igniter, submitted it to analysis, and pointed the finger at the mongrel mascot.

Prior to its assembly, he had mistaken the thermos-shaped igniter for a hydrant. His sentence was banishment from the test site, and the case was solved as a dog-gone mystery.

Incidental Intelligence

Item: A bat made of magnesium may appear on the baseball scene next season. Advantages: It doesn't sting the batter's hands, and it can't break. One disadvantage has been removed—it used to sound like a gong when it hit a ball, but now the familiar cracking sound is simulated. We doubt that the gong was a particular disadvantage. We'd like the sound of a four gonger.

Item: Keepers of the Naples, Italy, zoo blamed passion for a fight in which a male elephant killed the female sharing his cage. There may be unforeseen perils in letting nature take her course—especially in an artificial environment.

Item: In early Roman days keys were too heavy to carry, so slaves were chained to the door and to a 10 or 12 lb key. Our word janitor comes from the slave name, Janitrex.

Magic Number

We have just received the 1000th request for a set of reprints of our 25-part Program for Management (it's on profit growth) this year.

That's all the more remarkable because all 25 articles haven't been published. The sixteenth, on reliability and profit growth, appears in this issue (Page 93). Author George Howick shows how better quality standards mean better earnings for your company.

The remaining nine installments on profit growth will be published every other week over the rest of the year.

Conspicuous Consumption

Associate Editor Reed Trask wondered why some broken "glass" was kept so carefully in a case. R. Earl Sugg, research associate at Du Pont's Mechanical Research Laboratory, explained: The "glass" pieces were diamonds worth $1000 and excellent for making diamond knives, the characteristics of which Reed reported on last week (Aug. 7, p. 70).

The diamond pieces were originally ground like glass on the whim of an Indian maharajah who had his spectacles made from the gem.

Impact Issue Coming Up

A team of ten editors is beginning to get STEEL's fourth impact issue in shape for you. The regular format for the Sept. 4 book will be discarded, and we'll bring you a 40 page study in depth on automation and its effects on jobs.

STEEL's first impact issue, "Fight for Survival in New World Markets," appeared Sept. 5, 1960. The second, "Revitalize Your People Power," came out last Jan. 2. The third, "Let's Stop Price Fighting," was published Apr. 17. By the way, bound reprints of each are still available. The price is $2 per copy. Discount rates for larger quantities can be obtained from our Reprint Dept., STEEL, Penton Bldg., Cleveland 13, Ohio.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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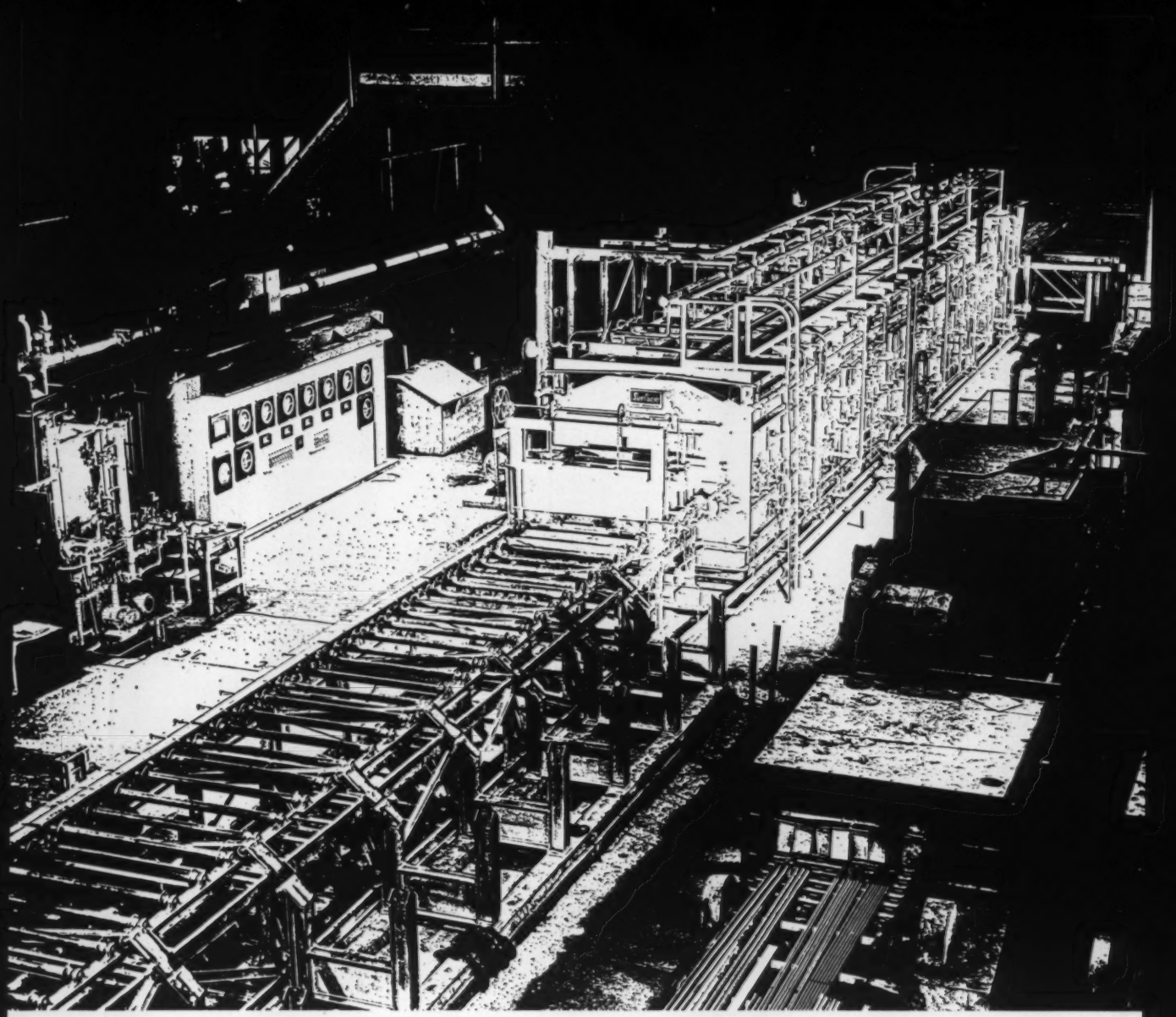

Courtesy of Jones & Laughlin Steel Corporation

Produces more steel and happier customers: Both Jones & Laughlin Steel Corporation and its customers have gained from this Surface furnace. For J&L, it affords continuous high production, uniformity through every bar in each load, accurate repeatability, and a variety of heating-cooling cycles. For J&L's customers, it delivers bar stock with the uniform microstructure which improves machining efficiency and profits. Address inquiries to 2408 Dorr St., Toledo 1, Ohio.

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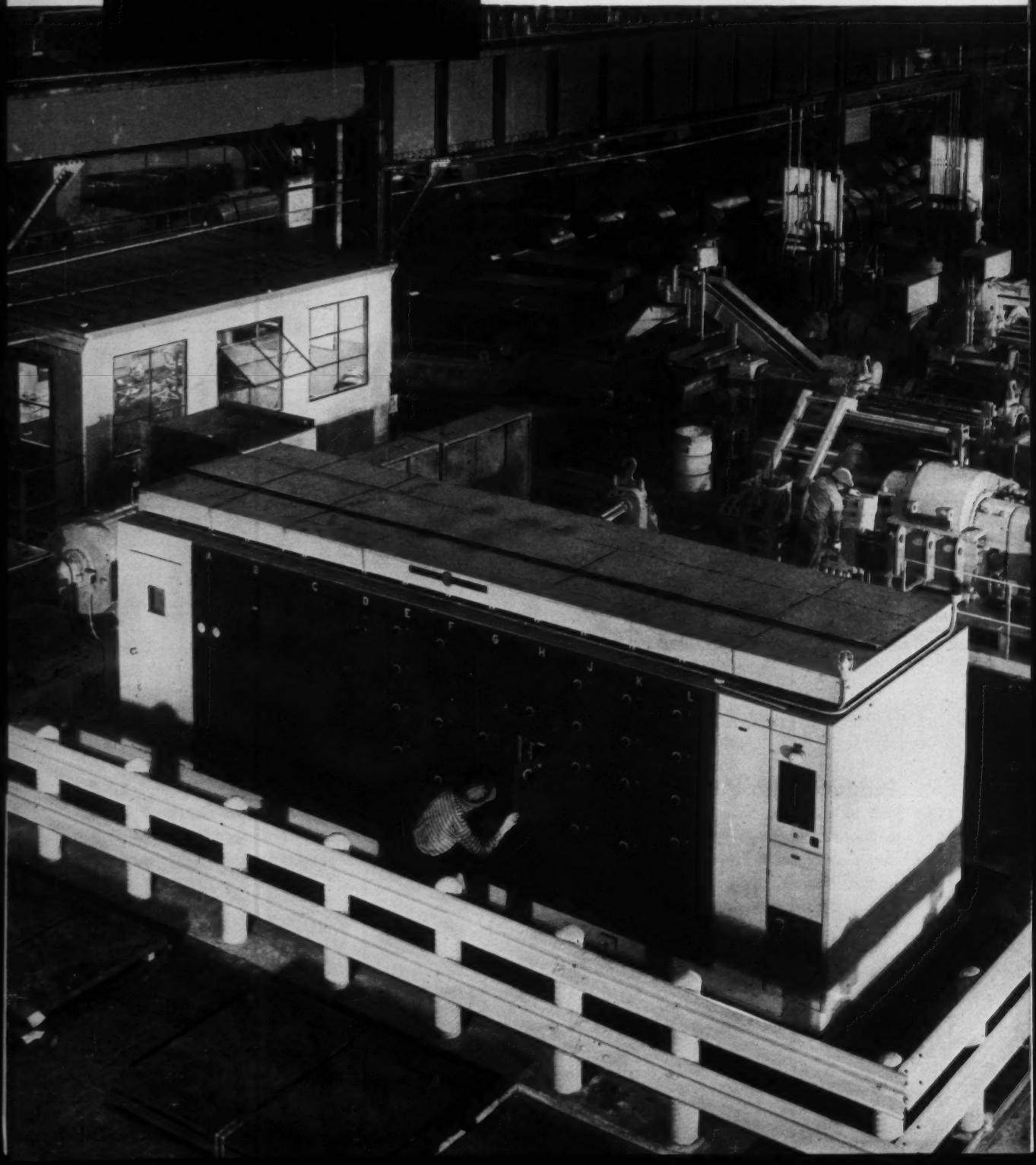
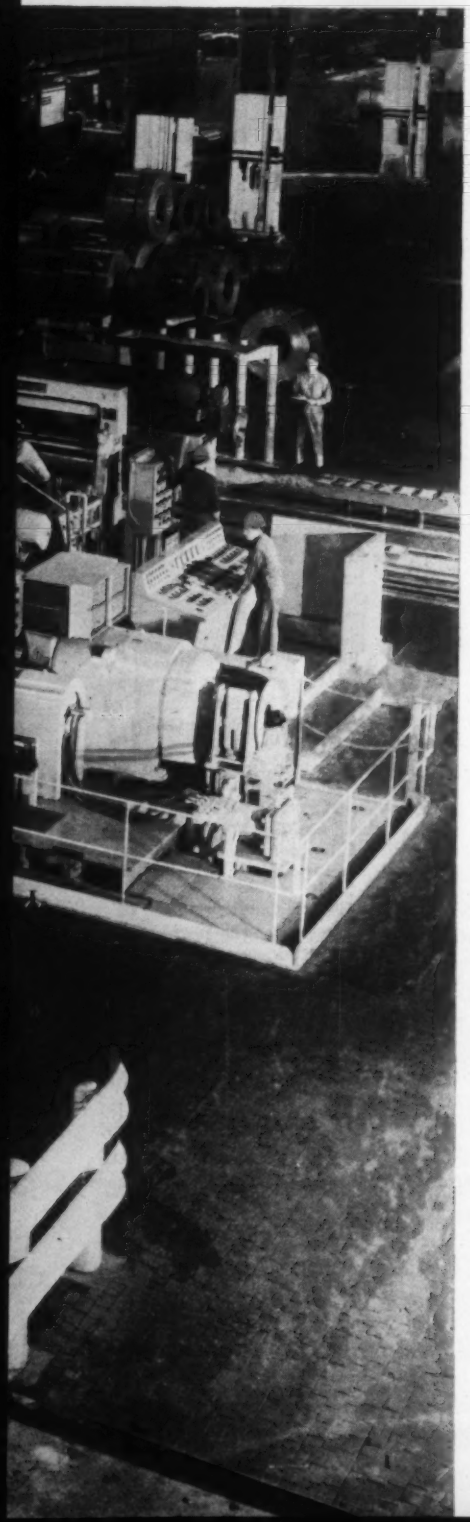
STEEL MILL CONTROL
AUTOMATED BY GENERAL ELECTRIC

Cut $100,000 or more speed start-up date



from installed cost of mill power supply, with General Electric power-control room



It's a fact! A General Electric power-control room can save you $100,000 or more in total installed cost of mill power supply, and will cut weeks from the start-up time.

This modern, custom-built unit—for control of rolling and processing lines—groups all power-supply equipment into a compact, pre-engineered, self-supporting structure, which is completely factory wired and tested. Power conversion, control, ventilation, and other equipments are not scattered around the mill . . . eliminating the need for expensive cable systems. Actually, $100,000 is a conservative estimate of savings. In some cases, savings in cable alone total that much. Other big savings can come from elimination of separate motor room (up to $12,000), separate ventilation system (as high as $20,000), special foundations (up to $7,000), and major check-out and tune-up (can cost more than $5,000).

Preparation for start-up, which takes weeks with conventional equipment, can be completed in days with a G-E power-control room. Because General Electric supplies engineering drawings immediately after design is finished, you can make many necessary preparations in advance of delivery. With all inter-control wiring and system testing completed before shipment, you need make only final connections and tune-up prior to operation. Faster start-up means your mill investment is producing salable output sooner.

Seventy-five years of experience in developing and building control equipment and systems for the steel industry stand behind General Electric's power-control room. Include a G-E power-control room in your modernization plans. And, call on General Electric for all process control. See your G-E sales representative, or write Section 785-17, General Electric Co., Schenectady 5, N. Y.

Industry Control Department, Salem, Virginia.

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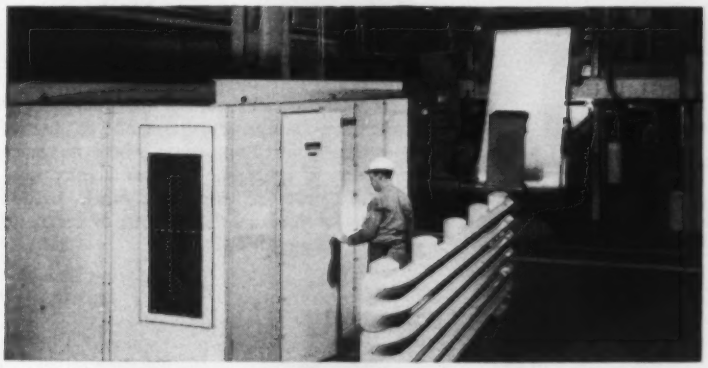
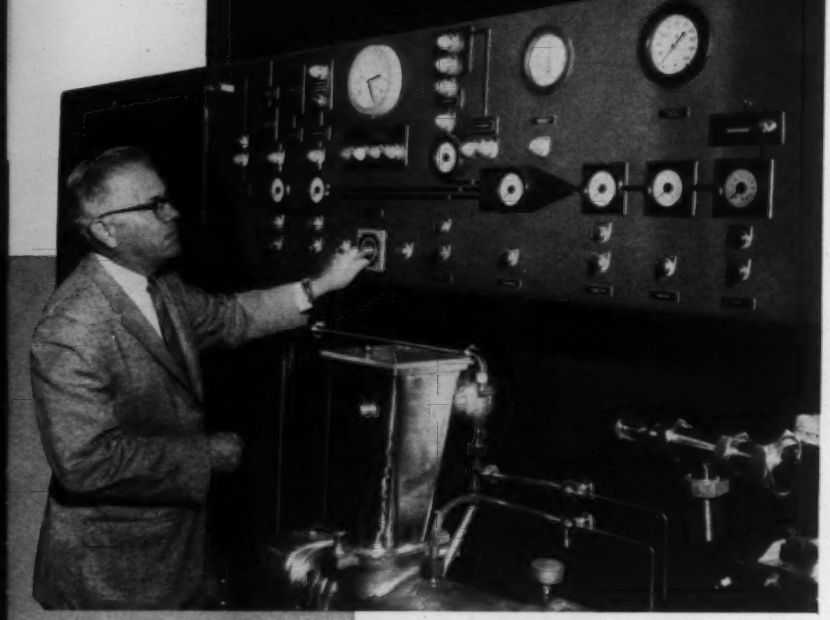
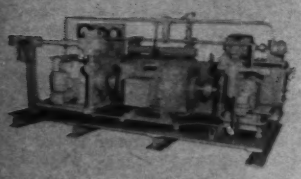
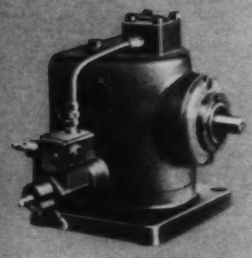


A POWER-CONTROL ROOM, such as the above at Armco Steel's Butler, Pa. Works, can reduce space requirements up to 50 percent. Put it in the best location—right beside the mill or in previously unusable space.

EQUIPMENT BUILT BY AMF'S UNION MACHINERY DIVISION USES THESE VICKERS COMPONENTS







CUSTOM POWER PACKAGE—A double-ended 60 hp electric drive motor is the prime mover for the two main hydraulic drives—one powering the developer (30 to 50 hp), the other driving the incorporator (5 to 10 hp). Vickers also supplies auxiliary control valving as part of the complete package. For more details on customized or standard power packages contact your Vickers application engineer.

PISTON PUMPS—AMF's application employs variable-displacement pumps having electrical remote volume control. Industry's broadest standard line includes models with flows to 180 gpm and pressures to 5000 psi, plus a wide variety of controls. For additional information write today for Bulletins 61-81, 61-84 and Catalog 5001C.

HYDRAULIC MOTORS—This fixed-displacement motor is only one of a complete line that includes models for variable horsepower (constant torque) or constant horsepower (variable torque) output characteristics in ratings from fractional to hundreds of hp.

Vickers adjustable-speed hydrostatic drives offer many unique advantages and economies —especially for applications where there are problems of space, weight, fast acceleration, infinite speed or tension control, sudden braking or reversing, hazardous or corrosive surroundings.

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CALENDAR
OF MEETINGS

Aug. 22-25, Western Electronic Show and Convention: Cow Palace, San Francisco. Convention director: Calvin K. Townsend. Business office: 1435 La Cienega Blvd., Los Angeles 35, Calif. Northern California office: 701 Welch Rd., Palo Alto, Calif.

Aug. 23-25, American Institute of Electrical Engineers: Pacific general meeting, Hotel Utah, Salt Lake City, Utah. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Aug. 28-Sept. 1, American Society of Mechanical Engineers: International heat transfer confrence, University of Colorado, Boulder, Colo. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

Sept. 10-12, Steel Service Center Institute: Great Lakes regional meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Institute's address: 540 Terminal Tower, Cleveland 13, Ohio. Executive vice president: Robert G. Welch.

Sept. 11-15, Instrument Society of America: Annual Instrument-Automation Show, Memorial Sports Arena, Los Angeles. Society's address: 313 Sixth Ave., Pittsburgh 22, Pa. Executive director: William H. Kushnick.

Sept. 14-16, Packaging Machinery Manufacturers Institute: Annual meeting, The Homestead, Hot Springs, Va. Institute's address: 60 E. 42nd St., New York 17, N. Y. Executive director: Russell L. Sears.

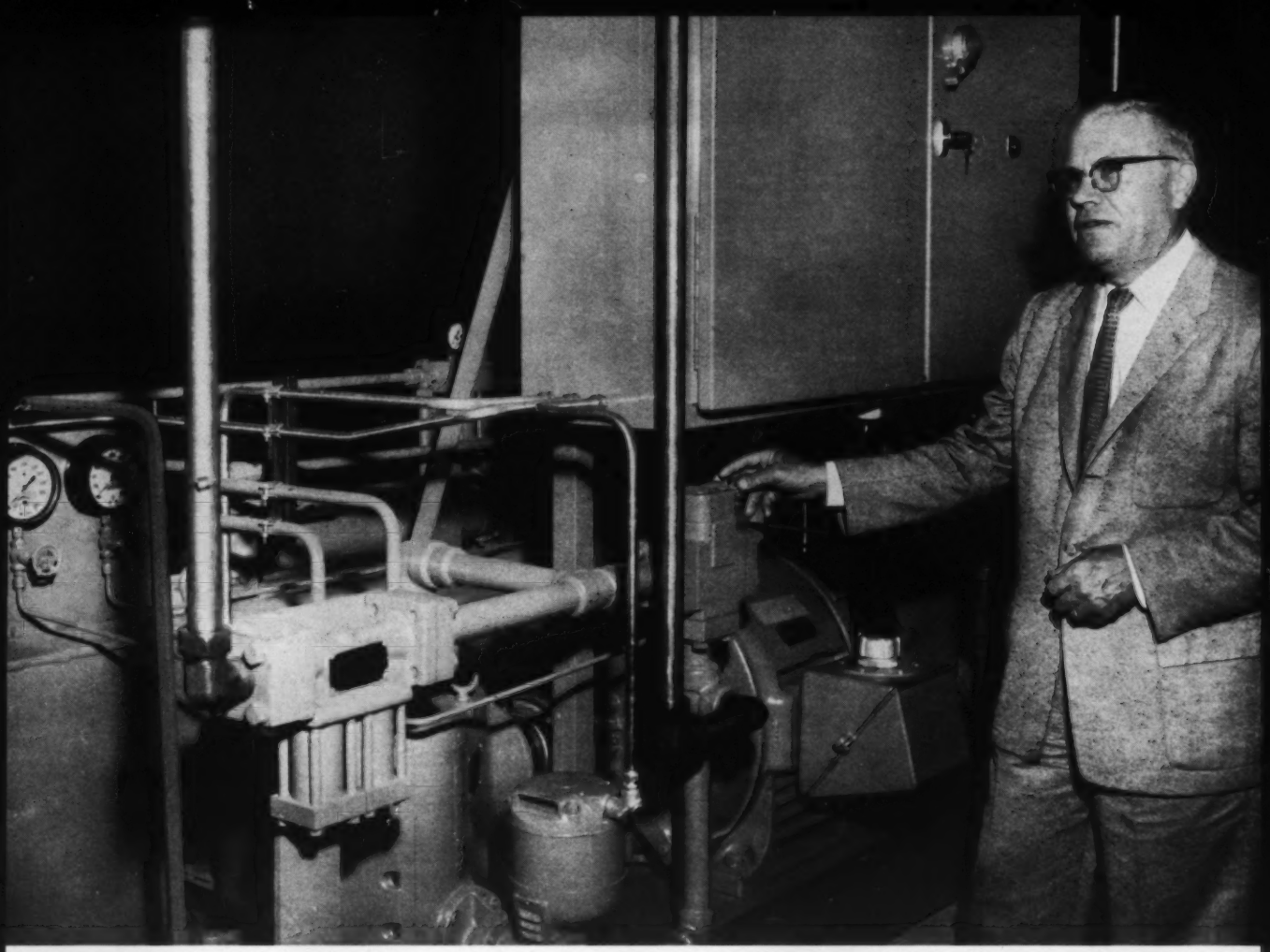
Sept. 17-21, Non-Ferrous Founders' Society: Annual meeting, Shawnee Inn. Shawnee-on-Delaware, Pa. Society's address: 1604 Chicago Ave., Evanston, Ill. Executive secretary: Herbert F. Scobie.

Sept. 24-26, Steel Founders' Society of America: Fall meeting, The Homestead, Hot Springs, Va. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Sept. 24-28, Pressed Metal Institute: Annual meeting, Grand Hotel, Point Clear, Ala. Institute's address: 3673 Lee Rd., Cleveland, Ohio. Managing director: J. D. Keith.

Sept. 25-28, American Welding Society: Fall meeting, Adolphus Hotel, Dallas. Society's address: 33 W. 39th St., New York 18, N. Y. National secretary: Fred L. Plummer.

Sept. 25-28, Association of Iron & Steel Engineers: Annual convention, Penn-Sheraton Hotel, Pittsburgh: Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.



MELBURN B. HANCOCK, CHIEF ENGINEER, AMF'S UNION MACHINERY DIV., SAYS:

"Hydraulics give us compactness, easy clean-up..."

". . . accurate speed control, and freedom from noise and vibration in the operating area. Because the use of adjustable speed hydrostatic transmissions on bread machinery was, in a sense, a pioneering effort, we found it essential and helpful to work closely with Vickers engineers in developing a completely workable system that offered our customers advantages unobtainable elsewhere.

"Our speed control must be accurate since any speed variation may degrade the end product. This speed control is required from about one-half speed to maximum speed of the equipment. Also, the system must be extremely flexible since operating speeds vary from time to time depending on characteristics of the raw material.

"With hydraulics we are able to reduce the overall size of the equipment for the production area where space is at a premium. Combined with other space saving design features, this machine is smaller than would otherwise be possible.

"Last . . . but by no means least in the food industry . . . is the ease with which the machine can be cleaned (firehoses are usually used to wash down equipment) because hydraulic units are sealed from external moisture, etc. This is a daily operation on breadmaking machinery and is a major advantage to commercial bakeries."

Whether your requirement is for a refinement to existing methods of applying hydraulics or a completely new approach to providing power and control to machinery, Vickers design and application engineers are ready to work with you to effect the most efficient and economical solution. See facing page for more details about components and systems used by Union Machinery Division, American Machine & Foundry Co., and the overall Vickers line.

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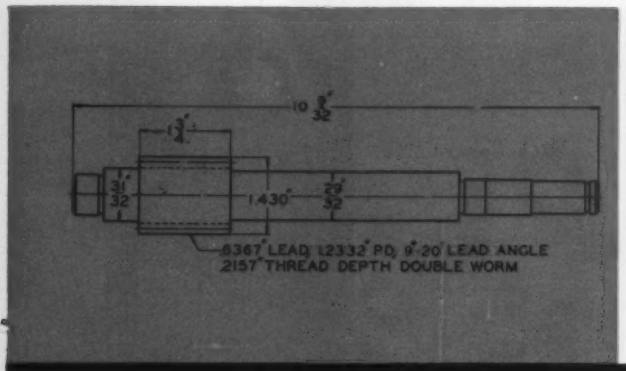
THREAD ROLLING

Shown here are five field installations in which the LANHYROL and LAN-NU-ROL Thread Rolling Machines have produced outstanding results and surpassed the highest of expectations. Production data from these representative jobs, shown on the opposite page, indicate the unequalled output, flexibility, and range coverage of these revolutionary machines.

Both Machines produce strong, accurate threads of excellent finish by the chipless, cold-forming process using four different Rolling Methods—Thrufeed, Infeed, Continuous and Reciprocal. The larger LANHYROL will thread all diameters from 0 to 3″ and the smaller LAN-NU-ROL 0 to 2″. Each Machine produces left- and right-hand threads of all types (except square), including UNC, UNF, Acme, Worm, and many special forms and is well adapted for automated processes. Soon to be announced will be the HY-DUTY Thread Rolling Machine. It will have a larger diametrical capacity than either the LANHYROL or LAN-NU-ROL. Watch for it soon.

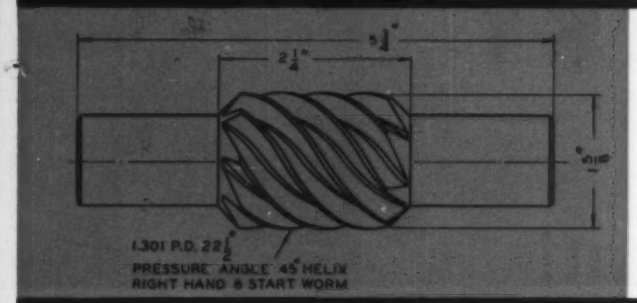
LANDIS *Machine* COMPANY
WAYNESBORO, PENNSYLVANIA
THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT

601C



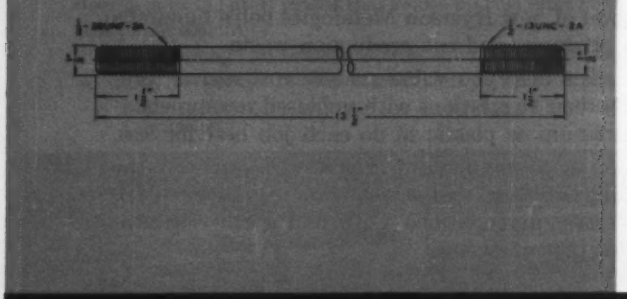
ROLLING INCREASES PRODUCTION FROM 4 TO 200 PER HOUR

Process—Infeed Rolling
Equipment—LANHYROL Thread Rolling Machine
Workpiece—Worm for an automotive-type differential for a riding lawnmower
Material—A.I.S.I. 8620 steel
Thread Specifications:
Diameter—1.430"
Length—1-3/4"
Type—.6367 lead, 1.2332" P.D., 9°-20' lead angle, .2157" thread depth, double worm
Production—200 pieces per hour (at 100% efficiency)



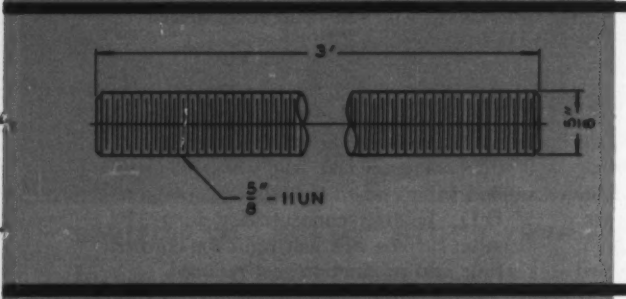
AUTOMATED ROLLING OF COARSE WORM PINION

Process—Reciprocal Rolling
Equipment—LANHYROL Thread Rolling Machine
Workpiece—Gear-reducer worm
Material—C1018 steel
Thread Specifications:
Diameter—1-5/8"
Length—2-1/4"
Type—8 start, 1.301" P.D., 22-1/2° pressure angle, 45° helix, right-hand worm
Production—180 pieces per hour (at 100% efficiency)



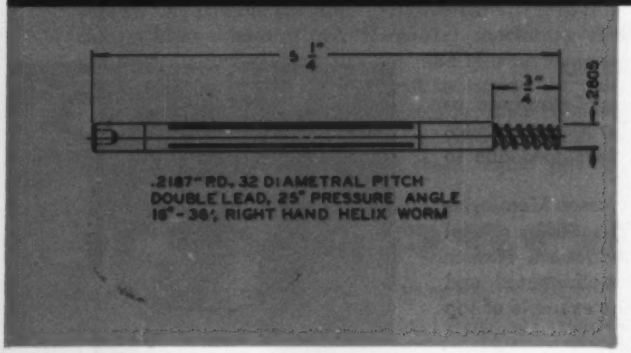
ROLLING DIFFERENT DIAMETER AND PITCH THREADS IN ONE PASS

Process—Continuous Thread Rolling
Equipment—"Extended Spindle" LANHYROL Thread Rolling Machine
Workpiece—Double-end stud
Material—8640 steel
Thread Specifications:
Diameter—1/2" (both ends)
Length—1-1/2" (both ends)
Type—20 pitch U.N.F. one end, 13 pitch U.N.C. on the opposite end
Tolerance—2A (both ends)
Production—103 pieces (both ends threaded) per minute (at 100% efficiency)



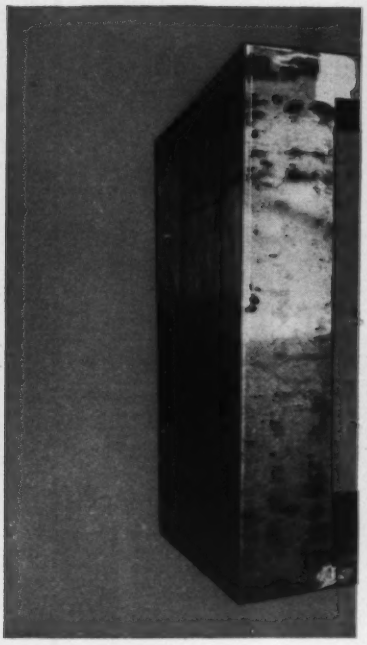
AUTOMATIC THRUFEED ROLLING CUTS LABOR COST

Process—Automatic Thrufeed Thread Rolling
Equipment—LAN-NU-ROL Thread Rolling Machine
Workpiece—Continuously-threaded bar
Material—A.I.S.I. 1018 steel
Thread Specifications:
Diameter—5/8"
Length—3'
Type—11 pitch UN
Production—216 inches per minute (at 100% efficiency)



LAN-NU-ROL PROVES IDEAL FOR SHORT-RUN WORM ROLLING OPERATION

Process—Infeed Rolling
Equipment—LAN-NU-ROL Thread Rolling Machine
Workpiece—Motor armature shaft for hand mixer
Material—A.I.S.I. C1040 steel
Thread Specifications:
Diameter—.2805"
Length—3/4"
Type—.2187" pitch diameter, 32 diametral pitch, double lead, 25° pressure angle, 16° 36', right-hand helix worm
Production—368 pieces per hour (at 100% efficiency)

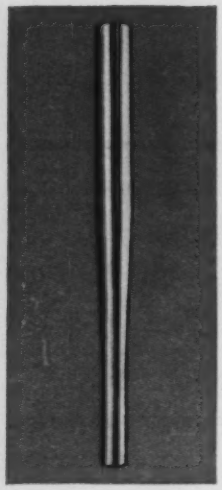


How METALOGICS* cools off the high-cost hot seat!

The following case histories are typical of how Ryerson Metalogics helps hundreds of companies save money, improve products, and cut production waste.

Metalogics-trained Ryerson specialists help you value-analyze cost-soaring production problems—and they back up their suggestions with unbiased recommendations on exactly the right steel, aluminum or plastic to do each job best for less.

Little wonder, then, that more and more companies across the country find the high-cost hot seat a little cooler after inviting a Ryerson man to value-analyze specific problems, and come up with recommendations. Give him a call—perhaps he can help answer some of your high-cost questions.



*METALOGICS—the Ryerson science of giving optimum value for every purchasing dollar.

PRODUCTION COSTS REDUCED 40%

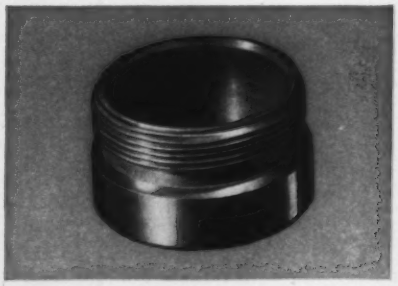
Company was making chrome-plated table legs as a 3-piece weldment and having problems in holding concentricity and making proper preparation for the mirror finish. In addition, production costs were high.

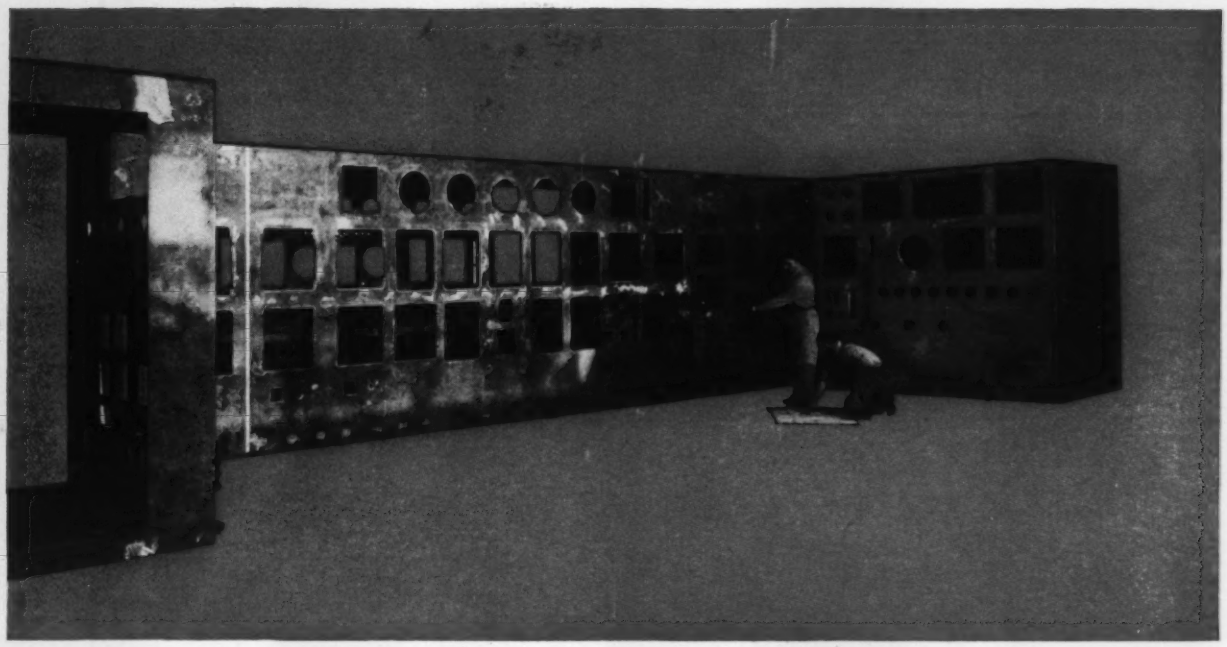
Ryerson recommended this Metalogical solution: make the legs from *one* piece of 3″ O.D. soft-annealed, cold rolled, electric-welded tubing—half the length tapered to 2″ O.D., holding concentricity to 1/32″. Results: surface was just right for chrome plating, and production cost reduced.

THREAD GALLING ELIMINATED

Manufacturer made this special coupling of aluminum to gain the advantages of light weight, corrosion resistance and easy machining. But a problem developed due to galling of threads.

Following the recommendation of a Ryerson Metalogics specialist, the company hard-coated the parts by special low-temperature anodizing which produced a surface hardness of Rockwell 70 C. Galling was eliminated, and corrosion resistance increased. One more example of top technical help from Ryerson.

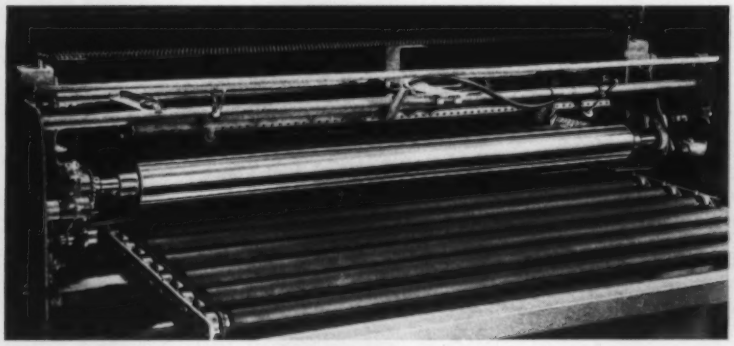




150 OPENINGS BURNED IN HUGE CONTROL PANEL ASSEMBLY

Expert Ryerson flame-cutters burned more than 150 openings in the steel plates that make up this huge control panel assembly.

Each opening had to be located and cut with extreme accuracy to permit proper installation of the complex instrument system. Distortion had to be carefully controlled and a high degree of flatness maintained so that the plates would have a good appearance when painted. All such requirements were readily met by Metalogically-oriented Ryerson service.



One end of close-tolerance roll. Note 3-step machining of bar.

SWITCH TO LEDLOY® STOPS TEARING...CUTS REJECTS

In making this roller coater—Gasway Corp., Chicago—was having trouble machining C-1018 bar stock to produce a close-tolerance roll. Three-step machining was required at both ends of the bar, and tearing was frequent with up to five stops per cut to regrind the tool.

After studying the problem carefully, their Ryerson specialist recommended a change to Ledloy 300. Results from this fast-machining leaded steel: higher production; longer tool life; rejects cut to a minimum.

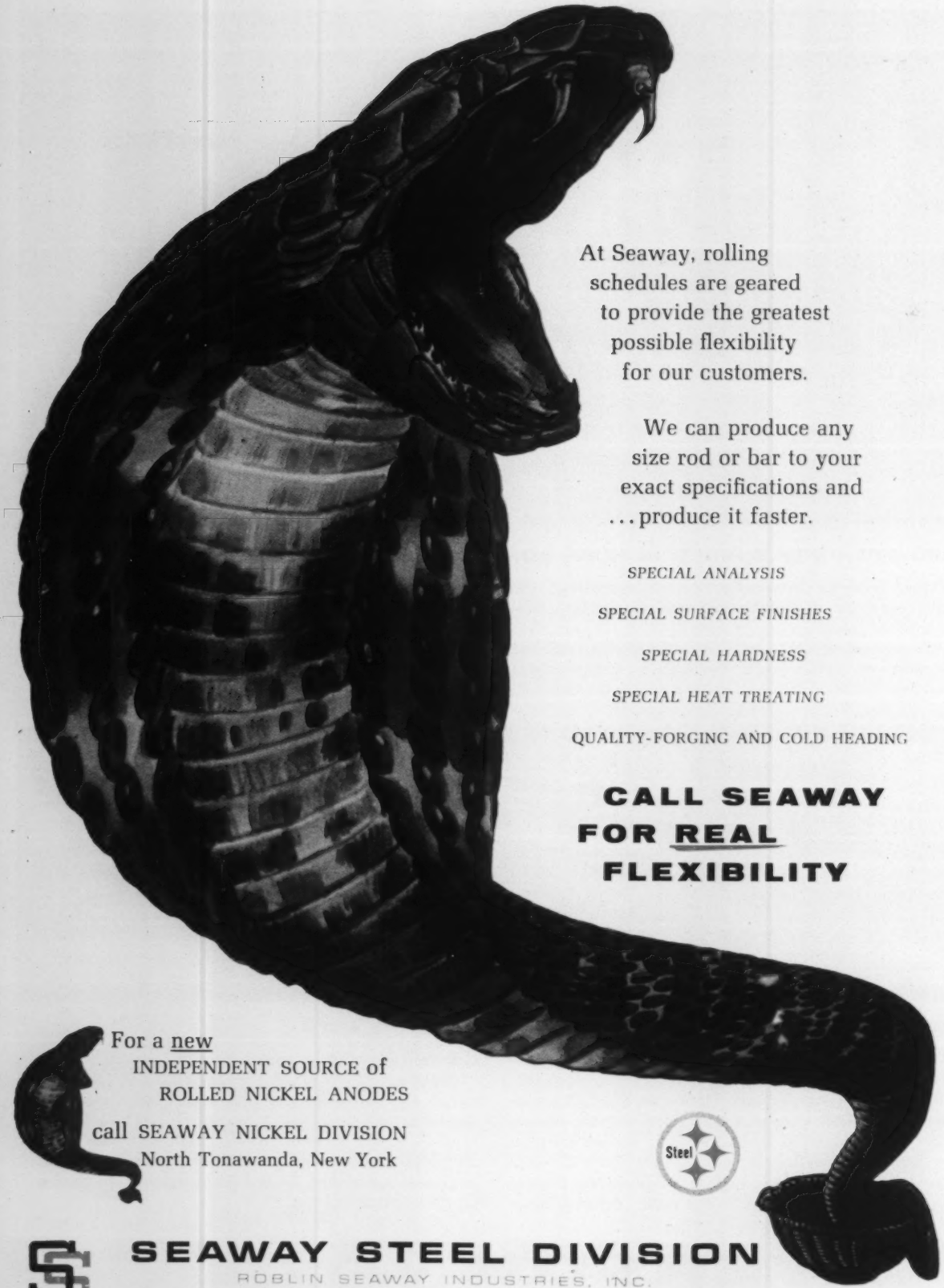
Other steels for this coater, including angles, expanded metal, and cut-to-size side plates, are also supplied by Ryerson.

As P. A. Bill Vastine puts it, "Time and time again Metalogics takes me off the spot. It gives me technical help, plus convenient, dependable, single-source service on all my requirements."

RYERSON METALOGICS

JOSEPH T. RYERSON & SON, INC., MEMBER OF THE LUKENS STEEL FAMILY

STEEL · ALUMINUM · PLASTICS · METALWORKING MACHINERY



At Seaway, rolling schedules are geared to provide the greatest possible flexibility for our customers.

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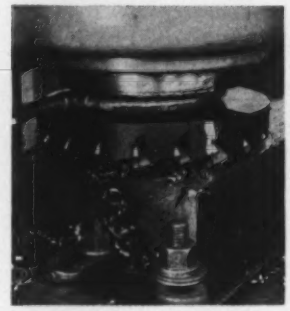
Ceramic Cutting Tools Capture Some Tough Jobs



At one time ceramics were oversold, but today they are regarded as first-class cutting tools. A natural for them is high speed finishing on ultrahard metals. Roughing of cast iron at high speeds is an everyday operation. Deeper cuts on steel are taken at almost every turn. Even cast iron milling is a production job for ceramics. And now, high speed milling of hard steel (photo) is being readied for production work. For more on the state of the art, see Page 128.

PAs Look for Steel Price Hike, but Few Build Inventories

A survey by the National Association of Purchasing Agents finds that half the PAs contacted look for higher steel prices in the fourth quarter, although some expect stainless prices to decline. Half the buyers also anticipate slower deliveries in the final quarter. But despite those beliefs, only 34 per cent plan to increase inventories, while 60 per cent plan to hold current levels.

First Half Profits: On the Lean Side

First National City Bank of New York has analyzed first half earnings reports for 519 manufacturing corporations. Here's what they found (percentage change in 1961's first half from 1960's first half):

All Manufacturing	−14%	Nonferrous Metals	−14%
Iron & Steel	−50%	Autos & Parts	−36%
Electrical Equipment	−22%	Other Transportation Equipment	+5%
Machinery	+9%	Other Metal Products	−5%

New Typewriter Is Design Departure

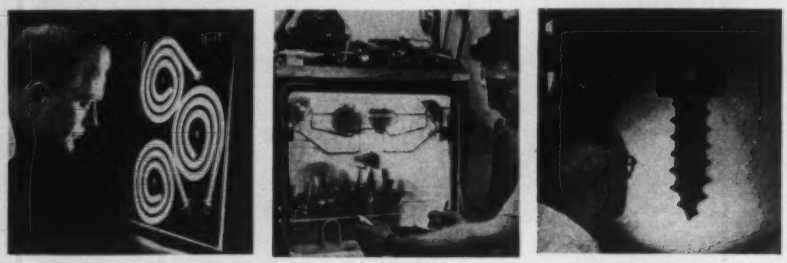
In the photo, you see the single typing element of the new, IBM "Selectric" typewriter. The conventional type bar is replaced by a spherical unit that moves on a carrier, eliminating the movable carriage. The sphere can be easily replaced with one containing another type face. The traditional ribbon spool has also been replaced—by a cartridge.

Here's Outlook for Seven Industries

The Business & Defense Services Administration has released its second round of reports on the second half outlook for key industries: **Metal Cans**—Volume will exceed that of 1960 and perhaps break the 1959 record. **Steel Shipping Containers**—Shipments in 1961 will about equal those of 1960. **Construction Machinery & Equipment**—About $1.6 billion worth will be

produced this year, about the same as in 1960. **Integral Horsepower Electric Motors**—Shipments will approximate those of 1960. **Power Boilers**—Thanks largely to near-record exports, the industry's shipments will rise about 33 per cent above the 1960 level. **Nickel**—Consumption in 1961 should about equal that of last year. **Games & Toys**—A boost in exports plus anticipated domestic gains will give the industry a good year. For other BDSA predictions, see STEEL, Aug. 7, p. 17.

Reliability: Profit Cornerstone



The push for higher reliability is being reflected in new demands on the design, purchasing, testing, and production functions. Emphasis on testing at Frigidaire Div., General Motors Corp., is illustrated above. Left: X-ray checks position of coils within a sealed electric range surface unit. Center: Patterns of water spray in dishwasher are analyzed through a special window. Right: Shadowgraph projector magnifies a screw 20 times for close dimensional check. That illustrates the reliance on testing as a feedback function for redesign. For tips on how to make your product more reliable, see Page 93.

Faction Tries to Restore Mamula to USW Post

Supporters of Nicholas Mamula, deposed president (STEEL, July 31, p. 16) of United Steelworkers Local 1211, have made their first move toward restoring him to office. A petition, signed by 734 members (the local has 12,000 members), asks for a meeting to reconsider the ouster.

Big Steel Boat Builder Unveils Aluminum Cruiser

Chris-Craft Corp.'s Roamer Yacht Div. (known as Roamer Steel Boats until last month) has unveiled a 27 ft, aluminum cabin cruiser. Most of the frame members (photo) have been fabricated from aluminum alloy plates. The first cruiser was unveiled Aug. 2 at Guy Lombardo's plush, Freeport, N. Y., home.

UAW's Gosser Pulls Switch

UAW Vice President Richard Gosser told Toledo, Ohio, stampers: 1. To stay in business and provide jobs, they might consider organizing to resist UAW demands. 2. If productivity (lagging in many Toledo plants) isn't improved, the UAW might step in and provide knowhow. 3. Because the industry is in dire straits, auto patterns will not be forced on UAW organized

Toledo stampers and probably won't be pushed in other sectors of the U. S. as well. 4. Pay cuts are not in order, but nonetheless, wage spreads must be narrowed. STEEL verified the report and learned that the confidential meeting was attended by UAW local and international representatives who report to Mr. Gosser and by company managers.

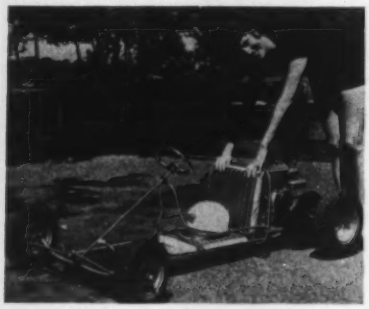
Hat Magic to Help TV

This comely young lady is holding the millionth Nuvistor made at Radio Corp. of America's plant in Harrison, N. J. The midget tube, used in TV tuners to improve reception in weak signal areas, may be reduced in size still further, says RCA, so that a derby like this will hold 3200 instead of the "mere" 1600 now. Other versions of the device have been developed for military and industrial applications.

International Air Rates to Be Slashed

Subject to government ratification, general air cargo rates will be slashed dramatically Sept. 1, following a proposal by the North Atlantic carriers of the International Air Transport Association. For example, rates from New York to London will be cut from 22 per cent (on shipments under 100 lb) to 63 per cent (on shipments over 16,500 lb). For other data on airfreight costs see Page 86.

Go-Kart Is Stainless



The booming Go-Kart market is being eyed by many metalworking firms. One, Allegheny Ludlum Steel Corp., has had a stainless kart built for it—it features more than 50 ft of stainless tubing, plus stainless rods, plates, sheets, and a cast stainless steering wheel. Spinster Corp., Farmington, Mich., built the AL Special. The nonsteel admirer is Patty Doyle.

Indonesia To Equip 14 Plants

Indonesia is shopping for equipment to completely outfit 14 manufacturing plants: One to make tin foil, four to make auto parts, three to make rebars, four to make storage batteries, one to make tin plate, and one to make cast iron pipe. To get in on the opportunity, contact Zakaria Raib, Department of Basic Industry & Mining, Djakarta, Indonesia.

Westinghouse Announces New Pricing Policy

Westinghouse Electric Corp. has announced a new pricing policy: Any future price increases which become effective after the date of the order would not apply to items shipped within 30 days of the revision. For items shipped within six months, the maximum price hike cannot exceed 5 per

STEEL The Metalworking Weekly

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cent—and it can't exceed 10 per cent on items shipped within 12 months. At the same time, the firm cut prices on 125 hp motors by an average of 7½ per cent.

U. S. Firms Invest More in Overseas Facilities

Commerce Secretary Luther Hodges predicts U. S. investment in overseas plant and equipment will rise about 20 per cent this year to $4.5 billion. In Latin America it will climb 50 per cent. He attributes the increase to worry that the common markets will tend to shut U. S. firms out of European markets.

Push for Lead-Zinc Legislation Builds

Chances for lead-zinc legislation got a boost last week when the Senate Interior Subcommittee on Minerals reported favorably on a bill that calls for increased tariffs and small subsidy payments. It is a companion measure to one introduced in the House by Rep. Wayne Aspinall (see Page 200). Monies collected from the tariffs would go into a fund to pay producers subsidies on the difference between the market price and 16 cents a pound.

Vacuum Melting Capacity Is Growing Fast

A mobilization survey by the Business & Defense Services Administration has found that U. S. capacity for vacuum melting steel, high temperature alloys, and nonferrous metals now totals about 150,000 tons annually, or double the 1959 total. Union Carbide Metals Co., a division of Union Carbide Corp., has reported that about 71 per cent of U. S. capacity is for melting steel and superalloys, while 19 per cent is for titanium, and the balance for other pure metals.

Straws in the Wind

During June, steel industry employment rose 13,641 to the highest point since August, 1960, the American Iron & Steel Institute reports . . . Employees of Volkswagen went back to work July 31 after their annual vacation (three weeks) with a 5 per cent pay hike . . . Hughes Aircraft Co. will hire more than 500 scientists and engineers during the next six months at its Culver City, Calif., aerospace laboratories . . . Automated manufacturing techniques have reduced by 43 per cent the price of L&R Mfg. Co.'s transducerized, ultrasonic, cleaning tanks.

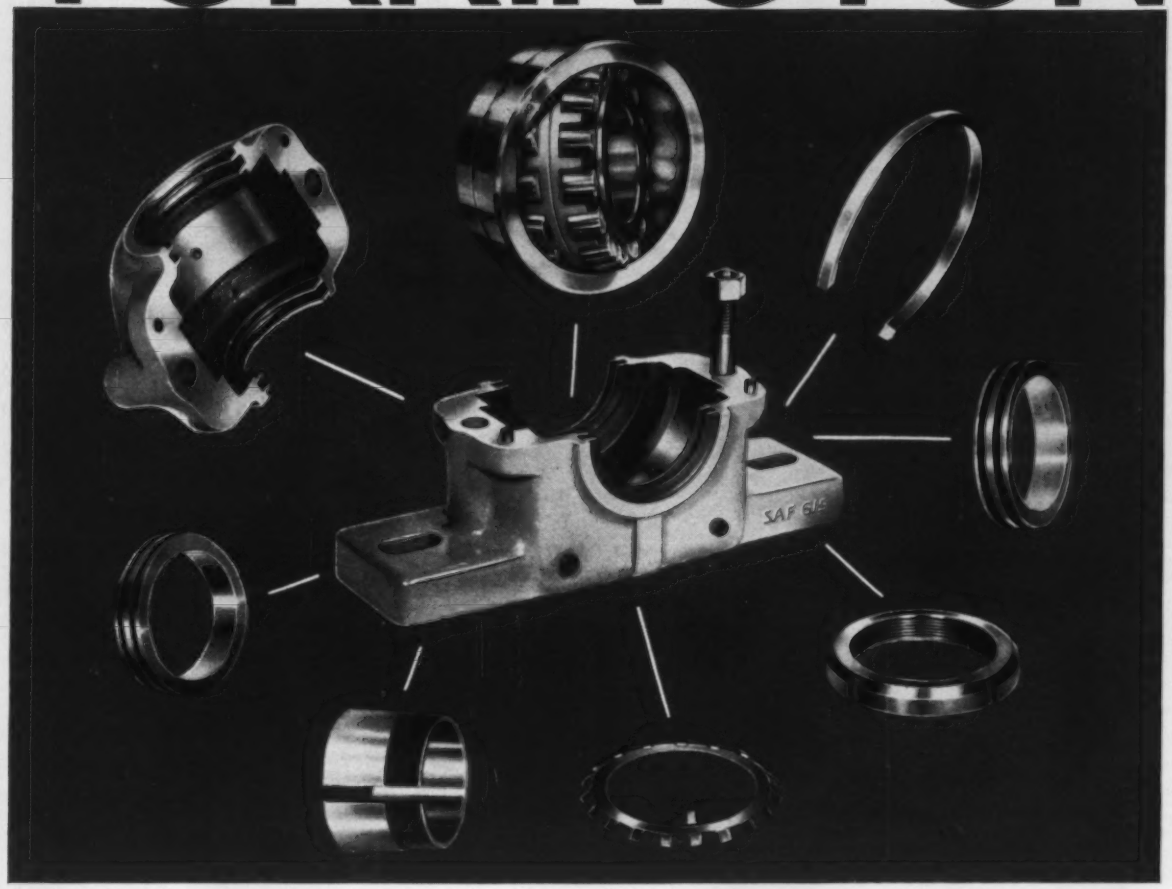
Metalworking Pulse

The Business Trend: In the week ended Aug. 5, STEEL's industrial production index declined 5 points entirely as a result of auto model changeovers. Look for the trend line to turn up in another week. **Autos:** Output last week plunged to the lowest level for a nonstrike week in many years. Only Ford Motor Co. was still producing 1961 models. Most makers will begin turning out 1962s this week. **Steel:** Ingot output rose to the highest point since June.

- **INDUSTRIAL PRODUCTION INDEX** (1947-49=100)
  Week ended Aug. 5 .... 159†
  Year ago 151
  Details on Page 103
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Aug. 12 18,000*
  Year ago 84,139
  Details on Page 100
- **STEEL INGOT OUTPUT (TONS)**
  Week ended Aug. 12 1,890,000*
  Week ago 1,850,000
  Details on Page 183

†Preliminary. *Estimated.

TORRINGTON

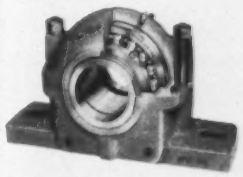


TORRINGTON SPHERICAL ROLLER BEARING PILLOW BLOCKS ...THE INSIDE STORY

All these parts make up a standard series Torrington Spherical Roller Bearing Pillow Block. What you *can't* see in the illustration is the painstaking engineering that goes into each part.

Housing caps and bases, for example, are doweled in pairs throughout manufacture to insure perfect register. The triple labyrinth seals are designed to avoid rubbing contact. A removable stabilizing ring allows "fixed" or "float" operation. The Torrington Self-Aligning Spherical Roller Bearing provides top operating efficiency even under heavy load and misalignment.

Do you have a pillow block problem? It pays to investigate the outstanding performance and long service life of the Torrington Spherical Roller Bearing Pillow Block. Call or write us today.



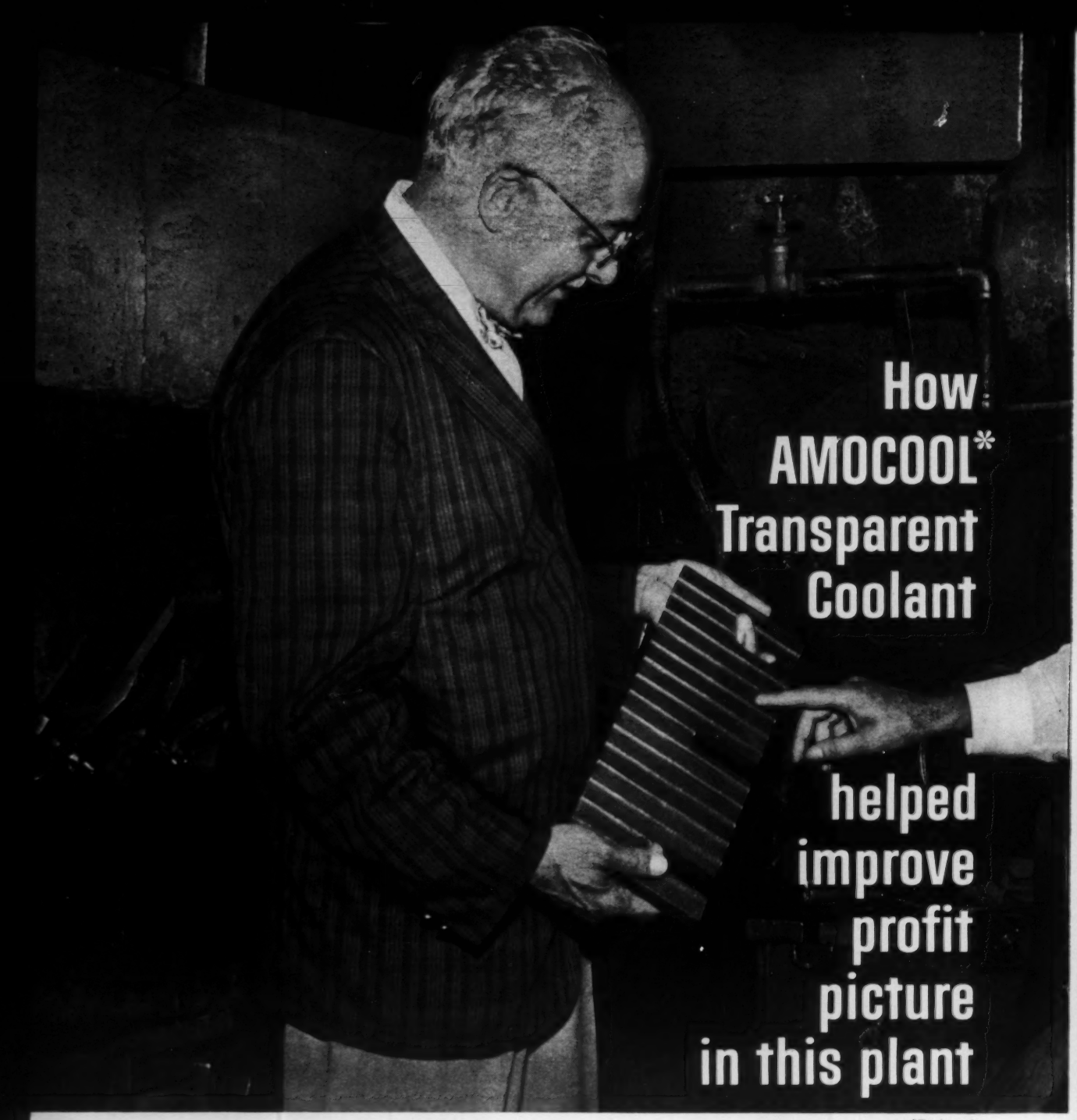
- ☐ Self-aligning bearing for high radial and thrust capacity
- ☐ Split housing for easy installation and inspection
- ☐ Grease or oil-bath lubrication
- ☐ Standard or heavy duty series available
- ☐ Closed end housing optional
- ☐ "Fixed" or "float" operation

progress through precision

THE TORRINGTON COMPANY

TORRINGTON BEARINGS

South Bend 21, Indiana • Torrington, Connecticut



How AMOCOOL* Transparent Coolant helped improve profit picture in this plant

*Trademark

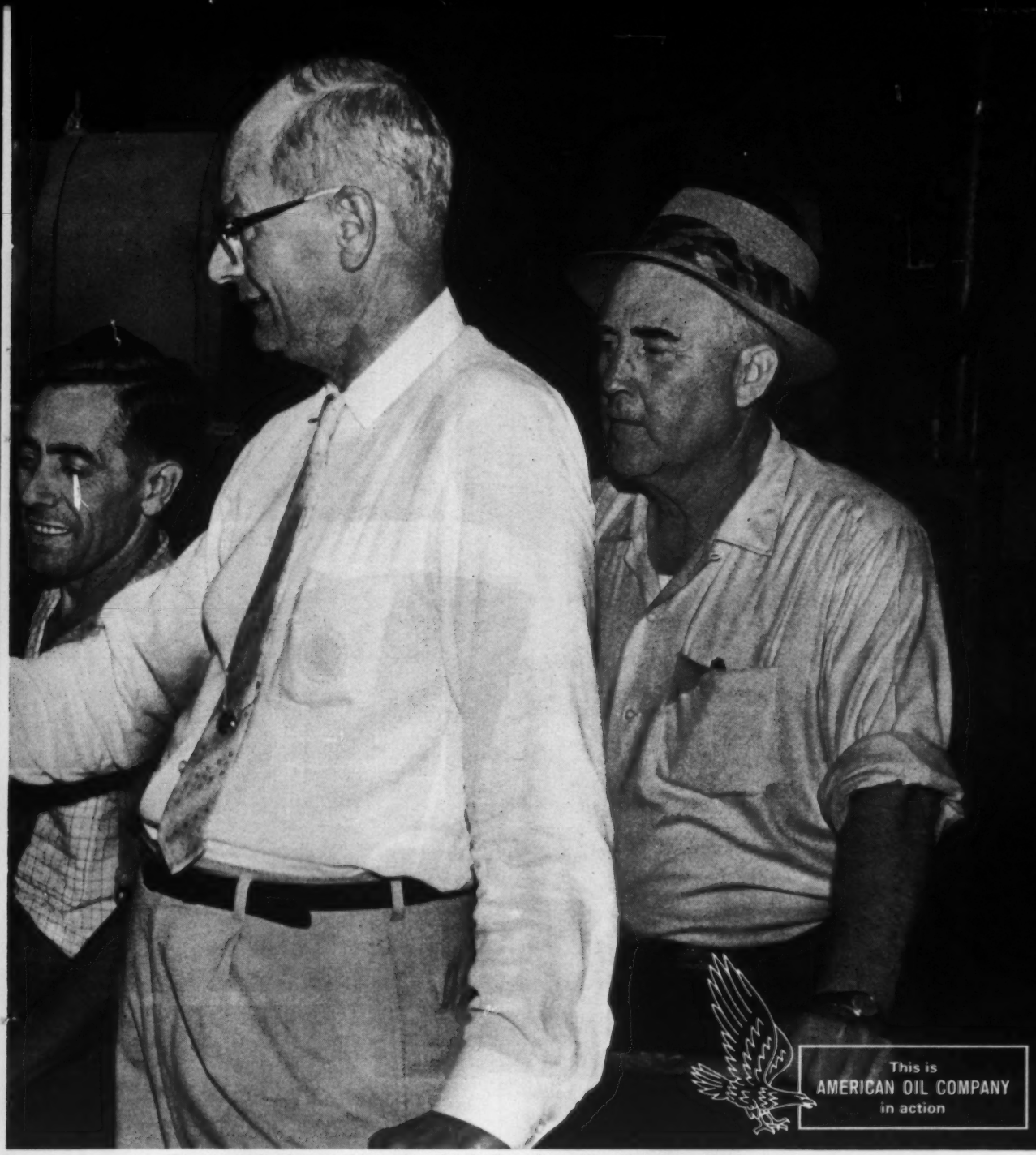
BY PAUL E. "PAPPY" STRATTON

About the Author. "Pappy" Stratton has been providing technical help on lubrication and metalworking problems to customers in the Detroit area for nearly all of the twenty-five years he has been working for the company. In addition to having this store of practical experience to help him, Pappy has completed the Company's Sales Engineering School.

* * *

By using a soap-base grinding compound, Detroit Edge Tool Company was getting excessive corrosion and rust on work and grinding machines. Oil vapor was collecting on machines and on the ceiling, causing dirty working conditions. Most important, high wheel loading was causing frequent down-time for wheel dressings.

We worked out a test program on AMOCOOL Transparent Coolant with the management. On our first test on one surface grinder, feed pressure was cut substantially while at the same time metal removal was increased.



Eliminate reworking because of rust, reduce wheel loading and extend intervals between wheel dressings; do these and you increase profit per unit, explains Detroit Edge Tool president, Dan Ebbing, to P. E. "Pappy" Stratton of American Oil. Plant manager, John Yonker (right) and Sam Vineh, operator, look on.

The cost of reworking parts to remove rust was eliminated. Time required to clean machines to get rid of the odor was cut in half. Less wheel loading and fewer wheel dressings have upped production and reduced costs. Our test program paid out in an improved profit picture. All grinding and drilling equipment has been converted to AMOCOOL Transparent Coolant.

* * *

Would you like this kind of technical help to assist you in improving profits? Get it by calling the American Oil Company office nearest you.

Quick facts about
AMOCOOL
Transparent Coolant

- Clear, transparent fluid
- Controls corrosion on work and machines
- All chemical. Does not support bacteria growth
- Unaffected by humidity
- Fire resistant
- Odorless

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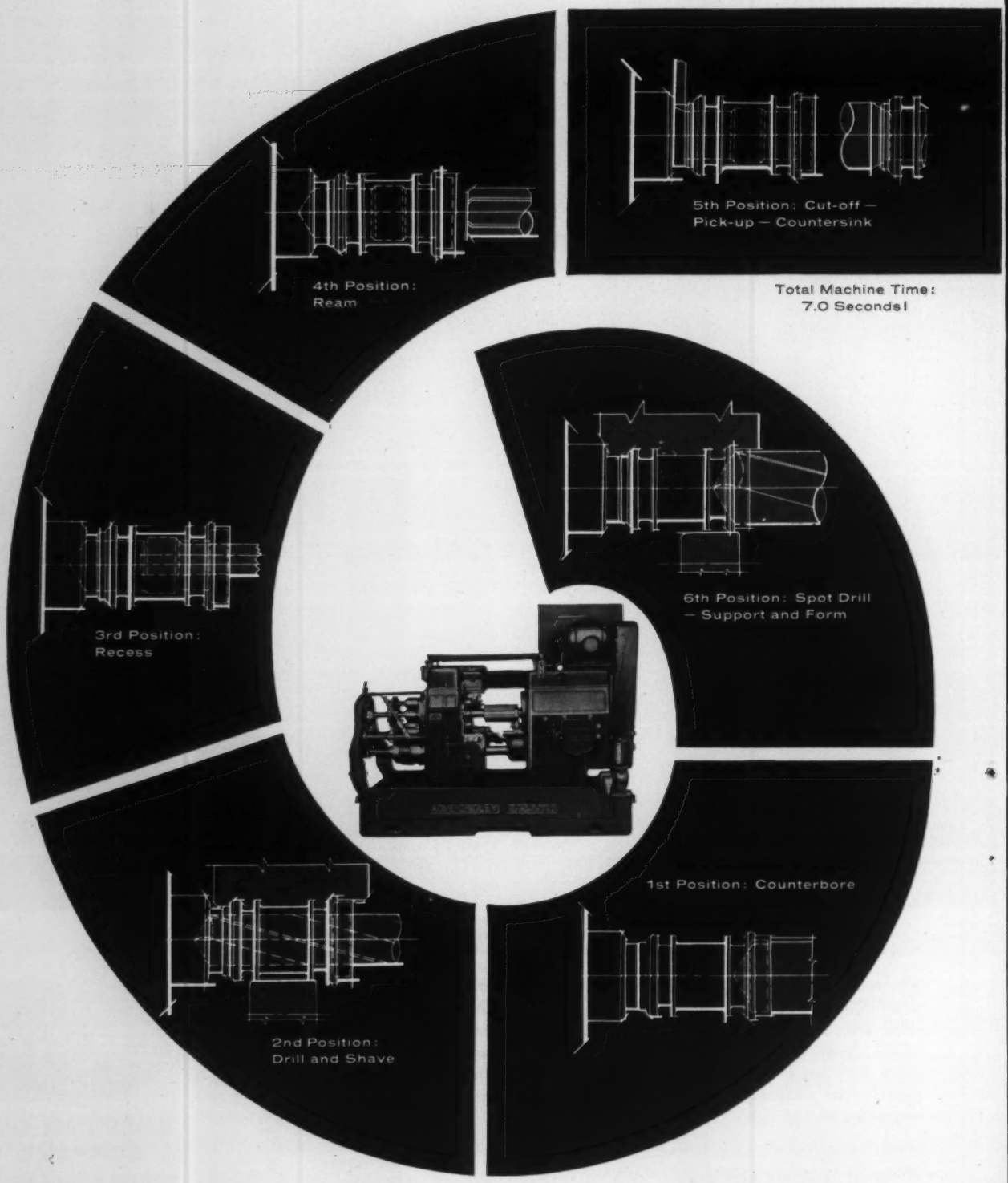
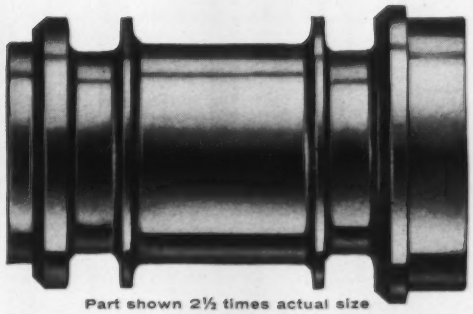
AMERICAN OIL COMPANY
910 South Michigan Avenue
Chicago 80, Illinois


5th Position: Cut-off —
Pick-up — Countersink
Total Machine Time:
7.0 Seconds!
4th Position:
Ream
3rd Position:
Recess
6th Position: Spot Drill
— Support and Form
1st Position: Counterbore
2nd Position:
Drill and Shave



Part shown 2½ times actual size

"EVEN WE WERE SURPRISED WHEN THE ACME-GRIDLEY DOUBLED OUR PRODUCTION

We'd refigured our set up for bushing blank production and were convinced that the Acme-Gridley would produce greater results than our current automatic machine set up. But, when we *doubled* production and wiped out a 7% reject rate to boot, we were amazed!"

Here at National Acme, we hear a lot of statements like this one made by Ness, Inc., up in Rochester, N. Y. They're one of the country's top product shops and tell us Acme-Gridleys have a lot to do with their success. Just about anybody who has to produce large amounts of an identical precision part will tell you the same thing.

The number of *different* jobs that can be set up on an Acme-Gridley amazes everyone. To give you some idea, we've described some 57 actual jobs in a new 64 page bulletin called "Circumferential Automation at Work". For your free copy, call, write or wire.

National Acme

The National Acme Company
189 E. 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N.J.; Chicago 6, Ill.; Detroit 27, Mich.

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has reached even higher standards of QUALITY than ever before. Our **CADMIUM** plated Music Wire especially merits your careful investigation if you are interested in superior corrosion resistance.

Our QUALITY will satisfy you . . . Our SHIPMENTS prompt, from ample stock . . . Our INTEREST in Customer requirements means "Once a Washburn Customer Always a Washburn Customer"

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WASHBURN WIRE COMPANY, NEW YORK CITY

CLEAN, UNIFORM BILLETS - STRIP - RECTANGULAR, ROUND, FLAT RODS

TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

TIPS FROM A ROLL MAKER'S NOTEBOOK

MACKINTOSH-HEMPHILL DIVISION, E. W. BLISS COMPANY, Pittsburgh 3, Pennsylvania

Cast mill rolls • cinder pots • rotary tube straighteners • end-thrust bearings • heavy-duty lathes • steel and special alloy castings

How to get the most from cogging hammer dies

For many years, we have supplied cast steel dies that are used for cogging ingots into billets and blooms. During this time, we've been aware of the variation in the service life of identical dies used in different plants under apparently similar conditions. As a result, we have tried to find out the cause.

HERE IS WHAT WE HAVE FOUND

Tricks of fitting spell the difference: Each blow of a drop hammer generates tremendous pressure at the moment of impact. For a 5-ton hammer, this pressure could approximate 10,000 tons. Hence, it is vitally important that the faces of the top and bottom dies be exactly parallel. Equally important is close fit of the dies in the top and bottom die holders.

The hot forming department at Universal-Cyclops' Titusville, Pa., plant gets the longest cogging hammer die life that we know of. Thus, a close look at Titusville's practice should be helpful.

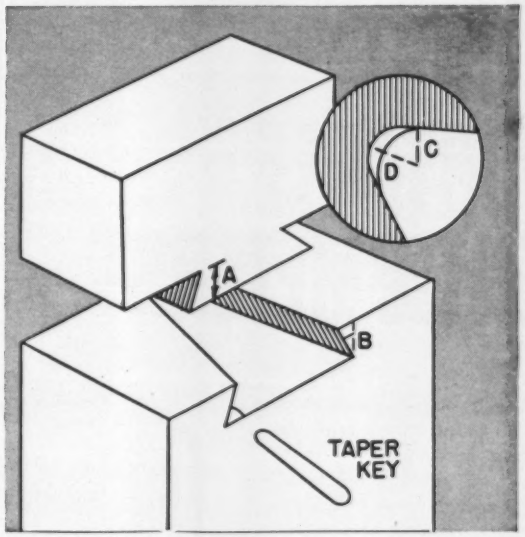
You can't argue with success: Let us take a specific case — the adjustment and fit of the bottom die in the sow block of one of Universal-Cyclops' 5-ton hammers (all remarks on tolerances apply equally to the fit of the top die in its holder).

Starting with new dies, the face of the shank key is machined to zero, and the wings are machined as close to the 3" setback as possible. Actual tolerance limits here are 3" min. and 3.004" max., making the die key face at most .004" high.

After extended use, the 16,000-pound sow block may shift slightly, causing the dies to go out of parallel as much as ⅝". Before removal for redressing, parallelism of the dies is checked, and if necessary, the face of the bottom die is machined to bring it into parallel with the top die.

Avoid weak points: Close seating tolerances are not the only prerequisites for maximum die life. Areas of potential structural weakness must be carefully avoided. For example, the fillet radius at the corner where the die shank key joins the die wing and the mating radius in the die holder should leave a space enough to sight between the die and holder. Universal-Cyclops uses ⅜" and ½" as these complimentary radii.

The angle of the shank key from the vertical is purposely kept to 7° for best performance. The greater the angle, the more the shearing effect as the relatively light die rebounds from the heavy anvil after each blow, tending to tear the shank.



Dimension A is 3.000" + .004". Angle B should be held to 7° from the vertical. Radius C is ⅜"; Radius D is ½".

To guard against shank retaining keys breaking off, Universal-Cyclops blues the key with chalk before seating it, and then checks it for uniform contact along the angled and tapered faces. Moreover, care is taken to make sure that the key isn't so high that it touches the wing of the die.

Choice of dies: Mack-Hemp "Red Top" cast steel dies are a development of our long experience in slabbing and blooming mill rolls. Their remarkable resistance to peening, "mushing," spalling and other varieties of wear has been proven time and again in open die forging work. If you start with Red Top dies and then follow the suggestions made above, we guarantee improved performance from your cogging hammers.

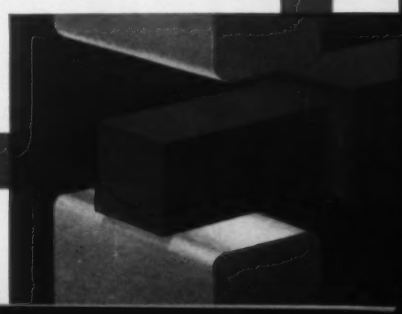
For help with your specific problem, whether it involves forging dies or mill rolls, simply write or telephone us at HE 1-3000, or send for our free Hammer Die Bulletin.

MACKINTOSH-HEMPHILL

You get more tonnage from "the rolls with the Striped Red Wabblers"

Division of E. W. BLISS COMPANY

Presses, Rolling Mills, Special Machinery



NEW, COMPACT LOW COST PORTABLE POTENTIOMETERS

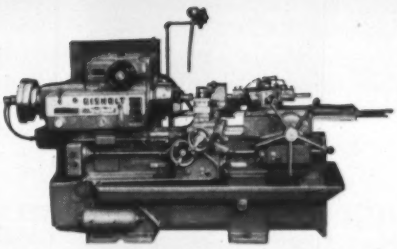
If you check thermocouples, recorders or controllers in plant or lab and are tired of lugging around an oversize instrument just to get the precision you need, you'll welcome one of L&N's three new portable—*really* portable—potentiometers. All the essentials—galvanometer, battery, standard cell—are compactly housed in a 7″ x 6″ x 5″ case . . . and weigh only 4½ pounds. An 8694 Single-Range and an 8695 Double-Range Potentiometer read directly in degrees in any of 15 temperature ranges. An 8696 Potentiometer reads directly in millivolts on two ranges, 0 to 22 and 20 to 64 . . . has a manual reference junction compensation dial, and can be used as a source of calibrated voltage for checking other potentiometer-type instruments.

Get the full story on these new compact instruments—*and* their compact price (starting at $200.00). Just phone your nearest L&N Office, or write for Data Sheet E-33(5) from Leeds & Northrup Company, 4957 Stenton Ave., Philadelphia 44, Pa.

LEEDS & NORTHRUP

Pioneers in Precision

SOMEBODY *is doing it for* LESS



MASTERLINE® NO. 4 Ram Type Turret Lathe—offers fast, easy operation, 16 spindle speeds to 2000 rpm and 25 hp driving motors for maximum metal removal with carbides.

Simplified controls, tracers for complex jobs (shown) and operator-oriented design permits handling short run work at minimum cost in time, labor and tooling.

Contact your Gisholt Representative or write for Catalog 1174-E.

Things can get pretty hot in a job shop.

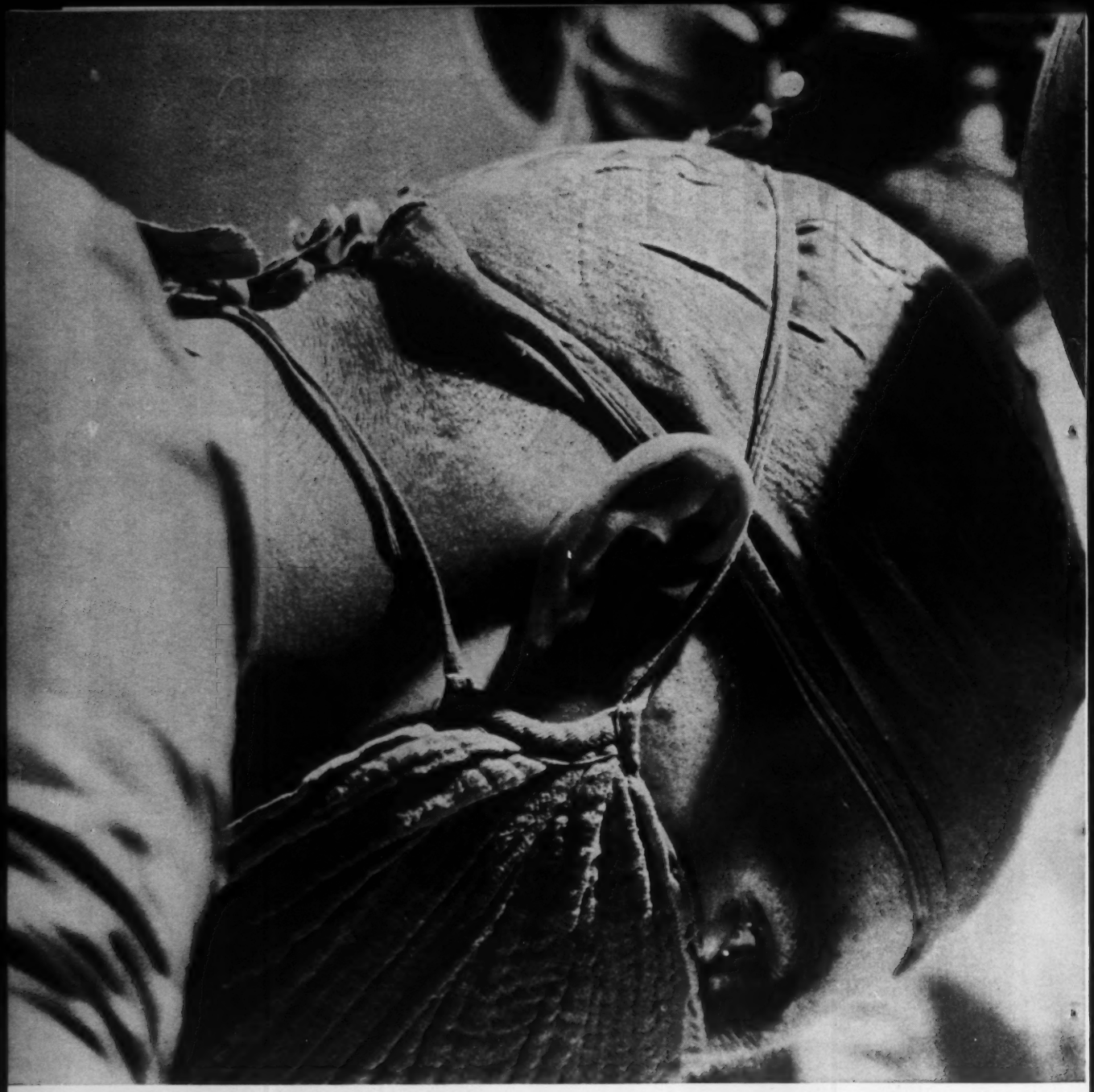
Competition forces you to quote new machine rates. Yet, if you're average, over 60% of the ram type turret lathes in your shop are 10 years old. They're only half as efficient as today's models.

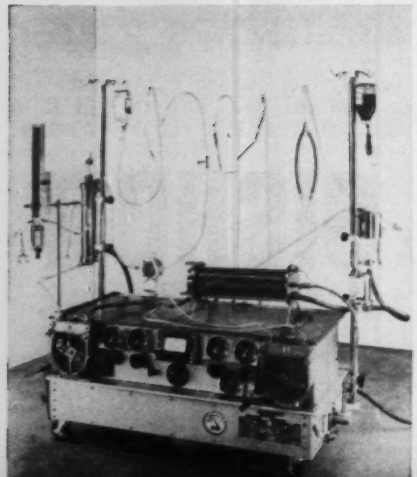
It's easy to see how profits . . . and contracts can be lost.

There is only one answer . . . replace old with new. Find out now, how Gisholt Ram Type Turret Lathes can help you do it for less.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

Turret Lathes • Automatic Lathes • Balancers • Superfinishers® • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee





Heart surgery is always a matter of life and death.

The people who perform these operations and the equipment they use must work flawlessly. When they open the heart, it stops supplying blood to the body. So, they use an artificial heart and lung machine that pumps out the blood, keeps it at body temperature, removes carbon dioxide, adds oxygen and then returns it to the patient. This machine must not fail!

The design, construction and materials of the artificial heart and lung machine are the very best man can devise. Pemco, Inc. uses USS National Seamless Steel Tubing (Type 304 Stainless) for pump fittings, blood handling connectors and vessels.

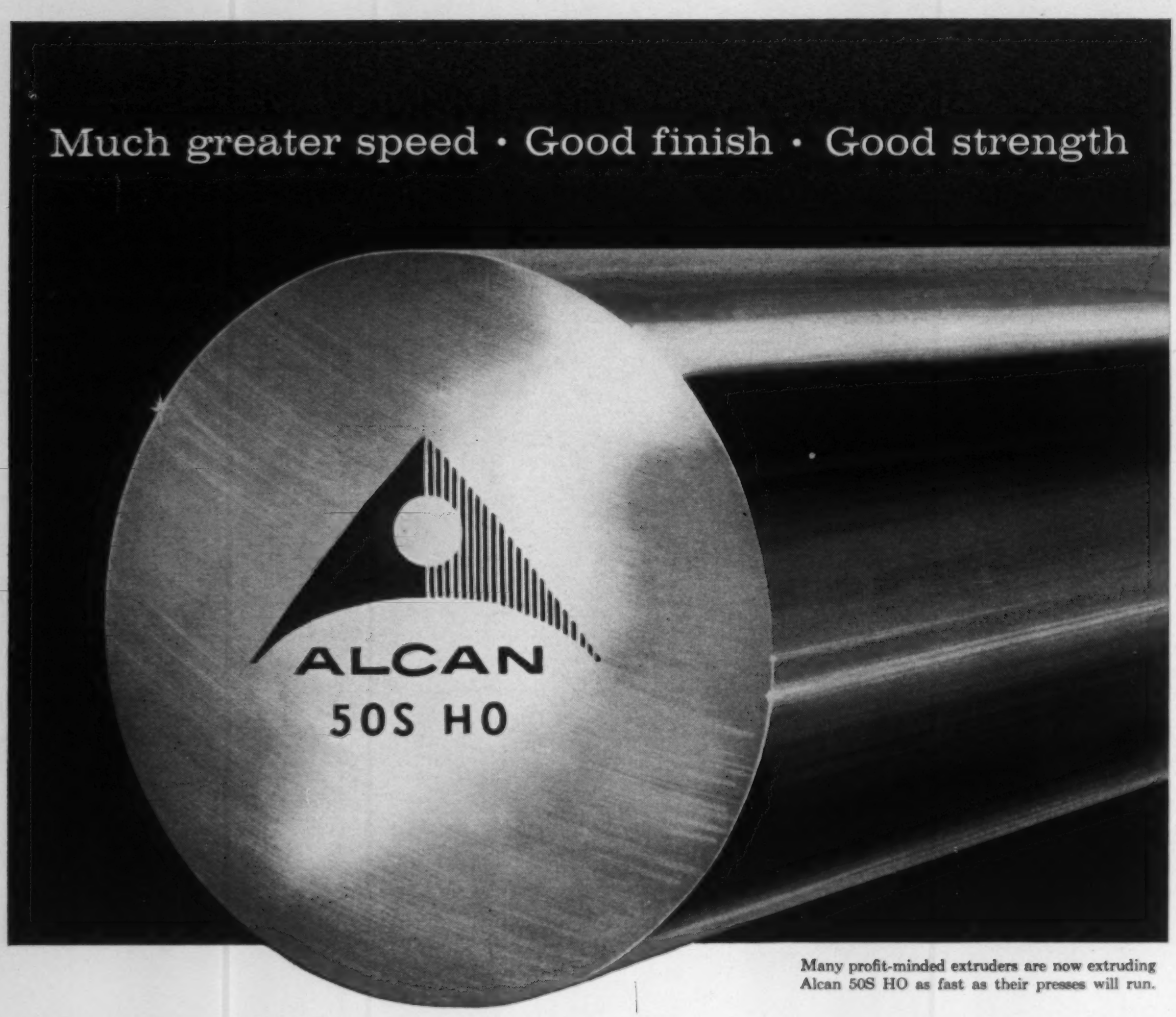
For tubing that can meet the most critical requirements, ask for USS National Seamless Steel Tubing. National Tube Division, U. S. Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS and National are registered trademarks

This mark tells you a product is made of modern, dependable Steel.

National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco Pacific Coast Distributors
United States Steel Supply Division
United States Steel Export Company, New York


Much greater speed • Good finish • Good strength

Many profit-minded extruders are now extruding Alcan 50S HO as fast as their presses will run.

Here in one aluminum ingot...

much greater extrusion speed... plus good finish and strength

WHEN you run Alcan 50S HO you get greater production . . . per day and per machine-hour . . . while still maintaining good mechanical properties and finish.

That sums up the experience of many fabricators now using this much-improved version of the long-time favorite Alcan 50S. They're unanimously enthused about its increased press speed . . . *up to maximum press capacity.*

Because of the all-around performance of Alcan 50S HO, there is no longer any necessity for stocking a large variety of ingot products. This one ingot takes care of the majority of product runs. Alcan 50S HO Ingot can reduce your inventory as much as 60%.

Alcan of course supplies other types of extrusion ingot to meet special job requirements.

Run 50S HO on your own equipment . . . and clock your production on the run-out table.

For further information on Alcan 50S HO, write or phone your nearest Aluminium Limited Sales Office.

Aluminium Limited

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ALCAN

NOW...ROUGH GRIND AND FINISH WITHOUT CHANGING DISCS

• • • get up to 20 times longer life with new flexible MX® Discs.

Now you can end forever the costly, time-consuming annoyance of changing discs between roughing and finishing. To take off metal rapidly with the new flexible MX® disc, simply bear down—watch the disc hug the workpiece as it grinds off stock. Then let up and finish the job with an easy smooth motion—all with the same disc! Use this remarkable new abrasive tool on flat work or on contours. Use it to remove welds, take out dents and imperfections—for hundreds of jobs on regular steel, stainless or aluminum. Your Carborundum distributor or representative will be glad to help.

Bonded Abrasives Division • Niagara Falls, N. Y.

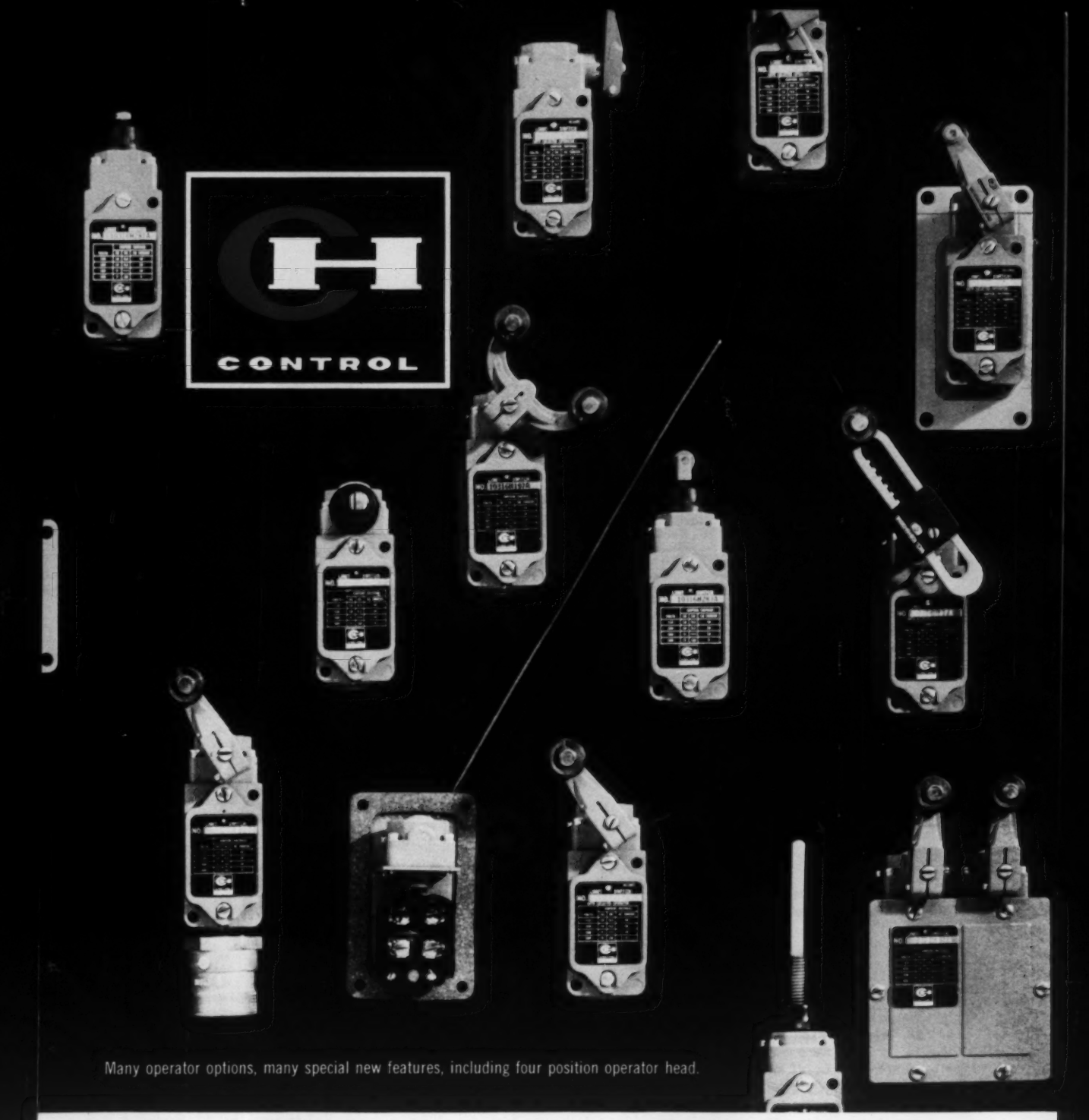
CARBORUNDUM

What's your problem? If you can solve it with a

New Cutler-Hammer operator options provide top flexibility... world's best oiltight limit switch

For any use, anywhere, in any position . . . you just can't buy a more reliable, longer-life switch. No other switch is sealed more effectively . . . effectiveness we've proved under test conditions so rugged they will never be equaled in actual service. Even the silver-to-silver contacts are visible for quick inspection. For full details on this complete new line, write for Pub. ED-145-Q213.

For any electrical control problem, contact your local Cutler-Hammer sales office or distributor. They'll supply you with the finest electrical components, the finest service and technical help.



Many operator options, many special new features, including four position operator head.

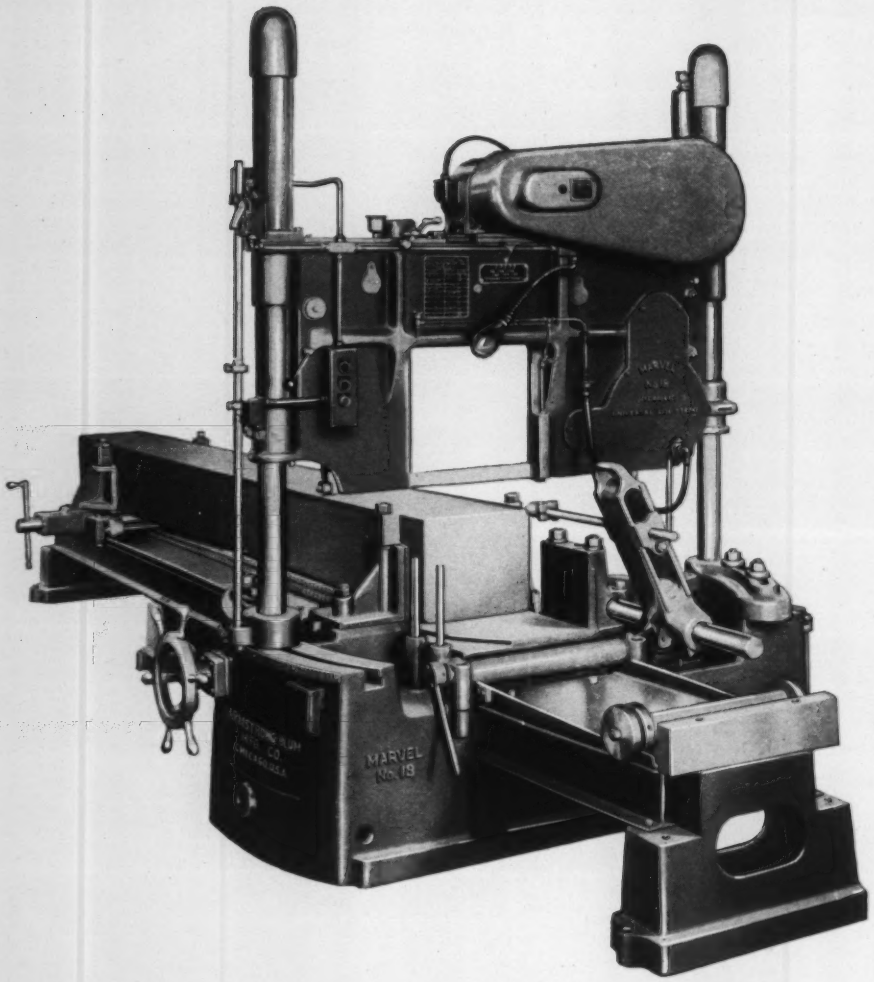
limit switch, your best answer's here!

WHAT'S NEW? ASK...

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. • Associates: Cutler-Hammer Canada, Ltd.; Cutler-Hammer Mexicana, S. A.

CONTROL



No Job too big or too tough . . .

for MARVEL "*Giant*" Hack Saws

These giant MARVEL Hydraulic Hack Saws (No. 18, Capacity 18″ x 18″; and No. 24, Capacity 24″ x 24″) were *basically* designed for rapid and economical cut-off of BIG WORK. They are not merely "conventional" designs "stretched" to big capacity. They are truly designed and built with the ruggedness and rigidity necessary to withstand the rough treatment of sawing big work, even though the work is in the "toughest of the tough" alloys.

They are reliably fulfilling the cut-off requirements in innumerable steel mills, forge shops, structural shops, warehouses, and machine shops, with assured low tool cost and minimum kerf loss of steel.

In addition to cutting-off, they are reducing costs by eliminating further machining operations. Heat treated die blocks are being reclaimed for re-sinking by sawing off the worn face; columns, beams, pipe, and tubing are being sawed to *finished*, square ends, eliminating milling; angular sawing is done conveniently by swinging the upper structure on the base, to any angle up to 45 degrees—*without moving the work*.

Contemplating the modern trend toward ever tougher steels and larger sizes, these are the logical sawing machines to buy, not only for today's needs but for tomorrow's as well.

Write for Catalog

Metal Cutting MARVEL SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

ASTM A-36 steel plate was used in rebuilding this payloader bucket for White Oak Excavator Co., Plainville, Conn. The Bethlehem steel plate, supplied by a prominent Steel Service Center, was selected for its strength and weldability.

ASTM A36 A242 A440 A441

Here's why these ASTM grades can cut your steel plate costs

It makes a lot of sense to order Bethlehem steel plates by ASTM Specification number, especially if you need specific mechanical requirements:

1. *You get a superior steel*—ASTM grades were developed by representative consumers and all plate producers working together to arrive at the best procedures for making these steels meet definite requirements.

2. *You can save money*—All four ASTM steels, summarized on the next page, have increased strength and three have increased corrosion-resistance. These advantages often permit cutting down on thickness, at no sacrifice of strength. Thinner sections can add up to a real saving in steel costs.

Steel

for Strength . . . Economy . . . Versatility

BETHLEHEM STEEL

BETHLEHEM STEEL

	YIELD POINT MIN. (X1000)		
	To ¾ in. Inc.	Over ¾ in. To 1½ in. Incl.	Over 1½ in. To 4 in. Incl.
ASTM A36—First Issued 1960 This specification is designed to produce increased strength with control of weldability by carbon and manganese requirements as necessary.	36	36	36
ASTM A440—First Issued 1959 **BETHLEHEM MEDIUM MANGANESE** This specification was issued to define the requirements for a higher yield-point grade for riveted or bolted structures or with controlled welding conditions.	50	46	42
ASTM A441—First Issued 1960 **BETHLEHEM MANGANESE VANADIUM** This specification, for welded structures, offers high yield-point, excellent weldability, and can give improved impact properties at moderate cost.	50	46	42
ASTM A242—First Issued 1941 **BETHLEHEM MAYARI-R** This specification was designed for welded structures where atmospheric corrosion resistance is important, and requires alloying elements to achieve the increased atmospheric corrosion resistance.	50	46	42

The increased mechanical properties of the four grades of steel plates in this chart often permit a reduction in plate thickness, cutting steel costs. These grades are all readily available from Bethlehem.

STANDARD OR SPECIAL PLATE REQUIREMENTS...

Here's how Bethlehem can help you

Here's how you can be sure your steel plate will do the job: just get in touch with us.

1. Let a Bethlehem metallurgist visit your plant and go over your problems with you. He can discuss not only all grades of steel plate, but the new ASTM Specifications too.

2. Let Bethlehem tailor-make plates to your particular requirement.

3. *A helpful hint for Steel Service Centers:* We'd like to help you stock steel plates that are right for *all* your customers. Let us recommend grades for your stock so you may economically supply plates for the many different needs of your customers.

Bethlehem carbon steel plates are used in the housings and bedplates of sugar mills produced by Farrel-Birmingham Company, Inc., Ansonia, Connecticut.

Steel

for Strength . . . Economy . . . Versatility

Here's why plate users like to buy Bethlehem

Bethlehem delivery dates are reliable.

Bethlehem sales offices in 40 cities are completely informed on plate deliveries for their customers. If you have any unusual delivery problems, you'll find our sales office people able to give you fast answers.

Nobody can beat the quality of Bethlehem plates. Our plate-producing facilities are modern. Quality control at every step and thorough inspection assures consistent top-quality.

Our metallurgical people are always ready to discuss any problem with you. Often they're able to make recommendations for an improved product, as part of Bethlehem's service to customers.

Bethlehem steel plates as thick as 3¾ in. are used in this machine, called the Bag-O-Matic, for curing rubber tires, built by the McNeil Machine and Engineering Co., Akron, Ohio.

Coils of steel plate are ideal for a continuous forming or stamping operation.

New! Plates in Coils

Bethlehem now furnishes steel plate in coils. To eliminate separate feeding, as in a continuous stamping or forming operation, these coils make possible real savings.

Any Bethlehem sales office will gladly furnish full information on plate coils, such as width, coil length, tolerances, slit edge, and pickling.

BETHLEHEM STEEL

BETHLEHEM STEEL

Bethlehem makes a wide variety of flanged and dished products, including ASME code, elliptical, standard, flanged only, dished only, shallow and double dished, and others. Many sizes of heads are stocked for fast delivery from Sparrows Point. Let us send you our stock list.

One of the most modern plate mills in the country is the two-stand, 160 in. plate mill at our Sparrows Point, Md., plant. Bethlehem supplies a full range of sheared- and universal-mill steel plates from .180 in. to 14 in. in thickness, in widths up to 150 in.

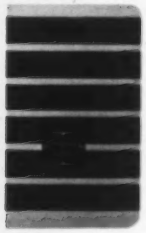
Do You have These Bethlehem Publications?

466—Steel plates—design information, tables, diagrams and metallurgical data.

S-58—Useful information on structural shapes for the designer. 80 pages.

415E—The fundamentals of alloy steels, including AISI classifications.

569—Specifications of 6 ASTM grades for construction (shapes, plates, bars).



420B—Analyses and grades of carbon, alloy, tool, stainless steels.

662—Description of highly specialized production of aircraft drop forgings.

513—Recommendations of tool steel grades for a variety of applications.

734—Description and properties of Bethnamel enameling sheet.

368B—Detailed information on wire rope, slings, and fittings

PUBLICATIONS DEPARTMENT
BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

Please send me the following literature as indicated:

☐ 466 ☐ S-58 ☐ 415E ☐ 569 ☐ 420B
☐ 662 ☐ 513 ☐ 734 ☐ 368B

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Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

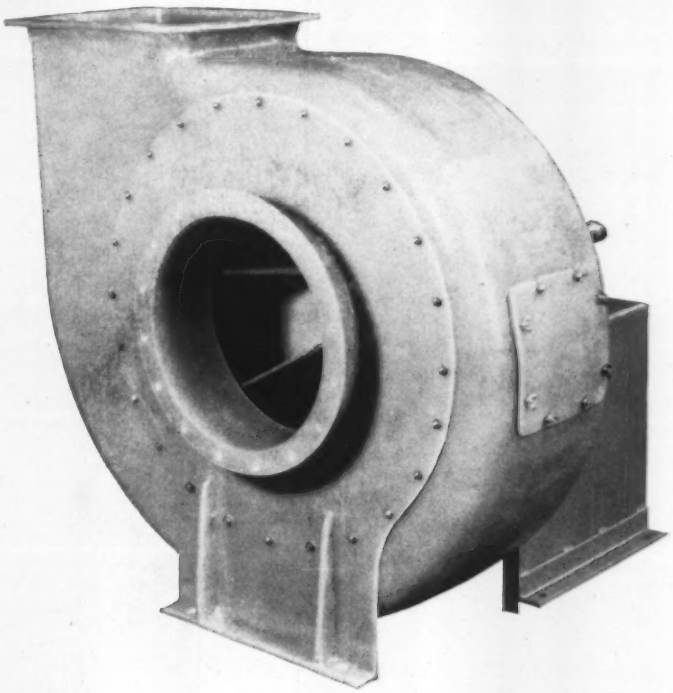
'BUFFALO' FG FANS

It takes more than an ordinary fan to exhaust many of the highly corrosive fumes encountered today... to do the job at a reasonable cost... and to resist chemical attacks. 'Buffalo' fans, with resin bonded fiber glass housings... fiber glass protected wheels and shafts, are that kind of fan.

Designed for temperatures to 225° F and higher, thermosetting plastics used on 'Buffalo' Type FG fans will not support combustion. They have high impact strength, excellent resistance to a wide range of acids, salts, gases, organic materials and other corrosives. The fans are statically and dynamically balanced to assure vibrationless performance.

A wide selection is available in capacities to 34,000 cfm and pressures up to 10" static. The Buffalo representative in your area can quickly provide helpful information related to your individual requirements. You can save time and money by consulting him.

...Fiber Glass Protection Against Corrosive Fumes



"Buffalo"

AIR HANDLING DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

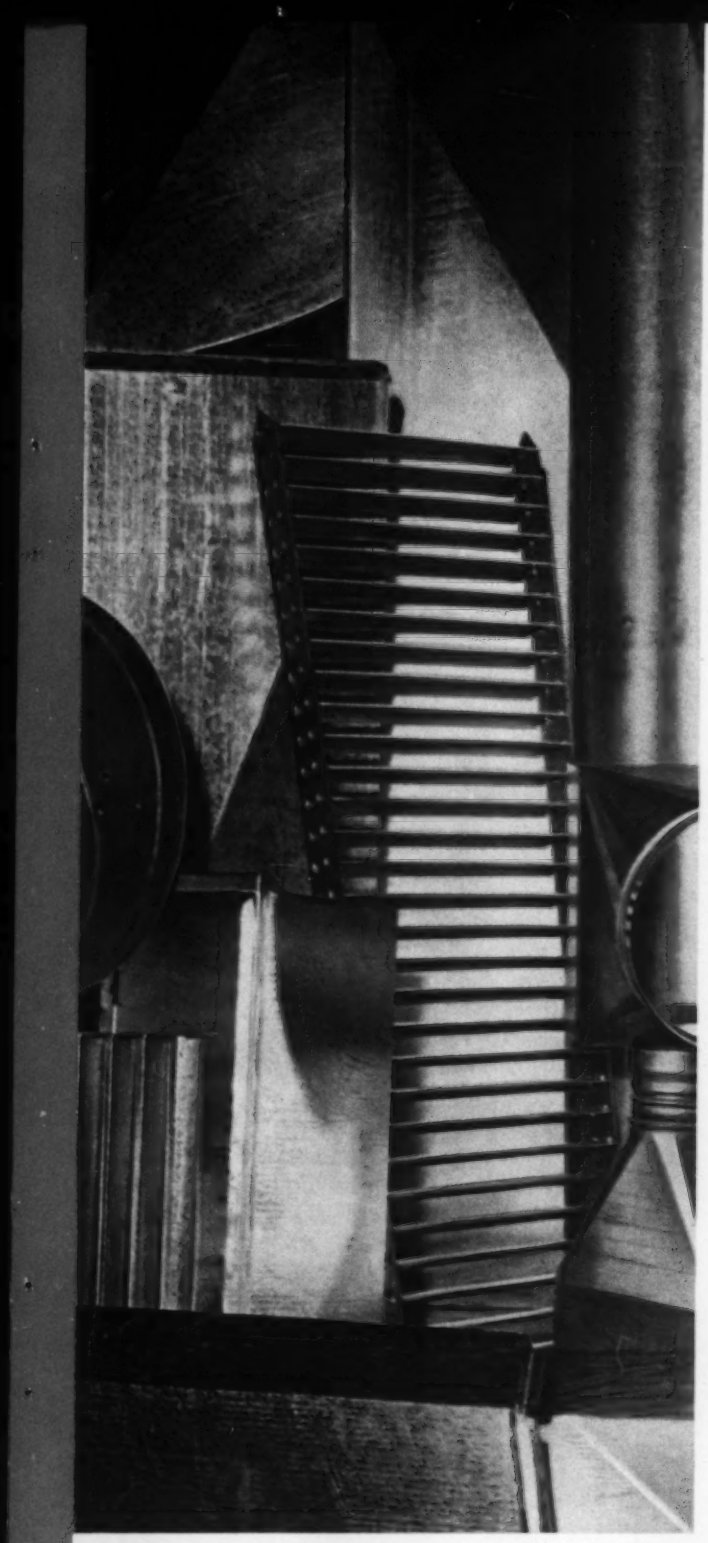
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.



tufkote

New high quality Youngstown galvanized sheet from the industry's newest, finest mill

A new 848-foot long continuous Sendzimir galvanizing line is rolling at Youngstown's giant Indiana Harbor Works. It is the most modern line in the world. Every month it produces 11,000 tons of **tufkote,** shiny new Youngstown galvanized sheet steel in coils, cut lengths; flat or corrugated.

Youngstown **tufkote** gives you a full range of coatings with absolute adherence. You get superior corrosion resistance, better appearance. You get better workability, better forming properties of both zinc coating and base metals. Test it, bend it, draw it, cut it, crimp it. Youngstown **tufkote** offers you the best combination of strength and workability—is unequaled in superior properties.

Get the exact coating, finish and adherence your specifications call for. Specify Youngstown **tufkote.** And count on fast delivery. Like over 800 other Youngstown steel products, new **tufkote** is Youngstown-made from ore to steel to mill to final cut sheet and coil. You can depend on quality and service when you order steel from Youngstown.

Youngstown – growing force in steel

For full details on Youngstown **tufkote** galvanized sheet, write: Dept. 10-C
The Youngstown Sheet and Tube Company, Youngstown, Ohio

BREAKING MEASUREMENT BARRIERS WITH MICROMETRICAL

COUNTS ROUGHNESS PEAKS FOR CLOSER SURFACE CONTROL

The Profilometer® with Peak Counter adds a new dimension to control of surface finish. This new combination shows the number of roughness peaks above a preselected height, in addition to showing average roughness height in microinches. We developed it to help solve surface-finish problems for sheet steel makers and users; and it has many other potential uses—perhaps in YOUR plant. Ask for BULLETIN LT143 and see.

MEASURES SURFACE WAVES TO AID PRODUCT PERFORMANCE

With many products, performance depends on the waviness around surfaces of rotation. The Wavometer® measures such waviness, in microinches, on a production basis. Example: In meeting a Navy quiet bearing contract, a ball bearing manufacturer checks the waviness around every raceway, as shown at right.

For waviness facts and Wavometer features, ask for BULLETIN LT10.

SHOWS FULL DETAILS OF ALL SURFACE IRREGULARITIES

In research or inspection, would it help you to know the height and length of surface waves, bows, or roughness irregularities? Dimensions and location of flaws or wear? Straightness, roundness or concentricity of ID's and OD's? Alert manufacturers in many industries meet ALL such needs with the Proficorder®—get pen-drawn magnified profiles that show exactly what they need to know. Interested? BULLETIN LT24 tells all about it.

MMC®
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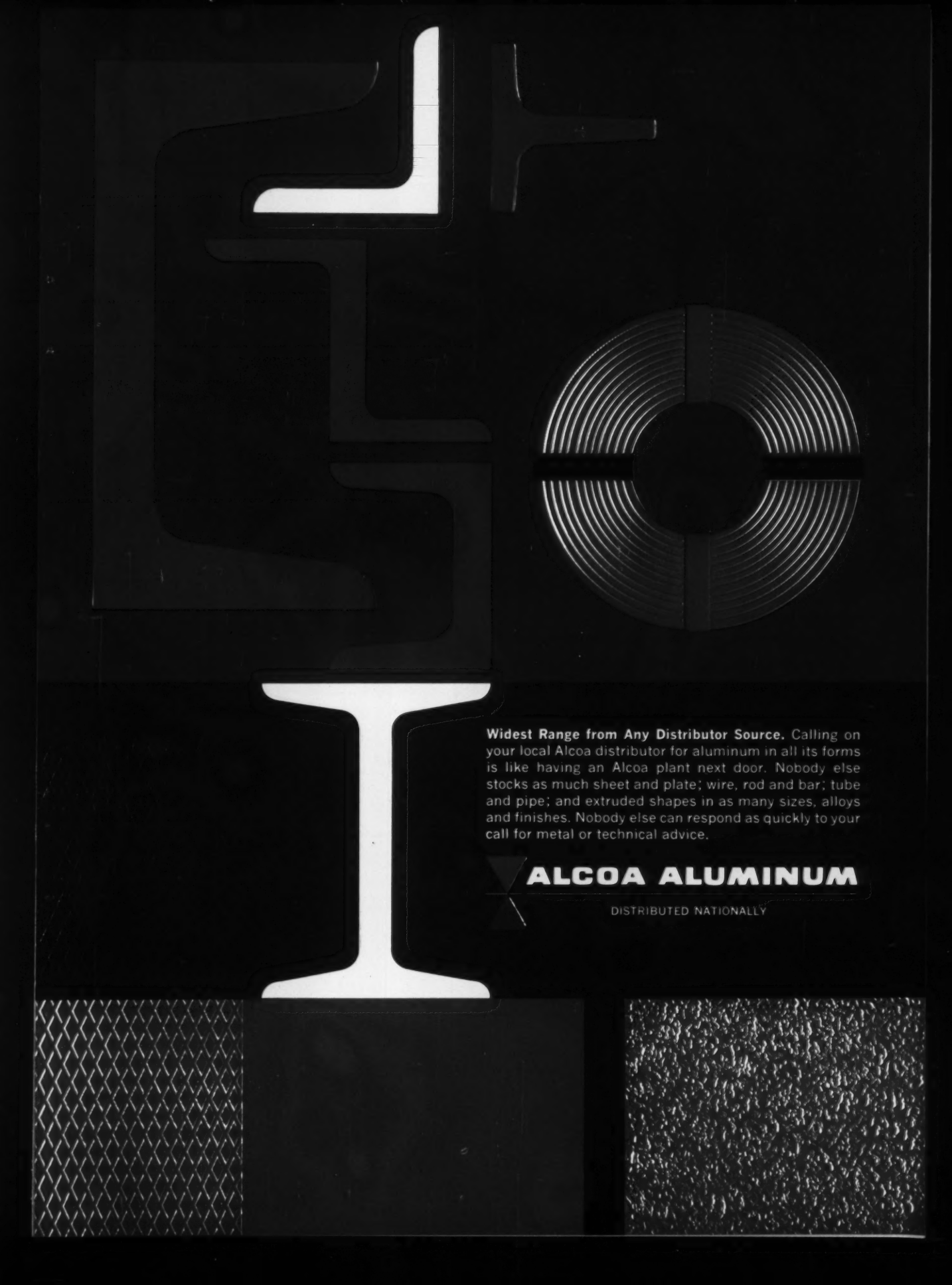
Manufacturer of the PROFILOMETER® • PROFICORDER® • MICROCORDER®
WAVOMETER® • ANDEROMETER® • VAROMETER®


Widest Range from Any Distributor Source. Calling on your local Alcoa distributor for aluminum in all its forms is like having an Alcoa plant next door. Nobody else stocks as much sheet and plate; wire, rod and bar; tube and pipe; and extruded shapes in as many sizes, alloys and finishes. Nobody else can respond as quickly to your call for metal or technical advice.
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Marsh Steel & Aluminum Co.
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Honolulu 14
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(94-861)
IDAHO
Boise
Pacific Metal Company (3-6468)
ILLINOIS
Chicago 80
Central Steel and Wire Company
(Republic 7-3000)
Chicago 80
The Corey Steel Company
(Bishop 2-3000)
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Steel Sales Corporation
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Indianapolis 18
Steel Sales Co. of Indiana, Inc.
(Liberty 6-1535)
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Wichita
Marsh Steel & Aluminum Co.
(Whitehall 2-3231)
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Louisville 3
Williams and Company, Incorporated
(Juniper 3-7781)

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Metal Goods Corporation
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MARYLAND
Baltimore 7
Whitehead Metals, Inc.
(Windsor 4-2000)
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Cambridge 39
Whitehead Metals, Inc.
(Trowbridge 6-4680)
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Eastern Metal Mill Products Company
(Highlands 2-5900)
MICHIGAN
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Central Steel and Wire Company
(Twinbrook 2-3200)
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Edgcomb Steel of New England, Inc.
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(IV 9-3281)
Buffalo 17
Brace-Mueller-Huntley, Inc.
(TR 7-8700)
Buffalo 7
Whitehead Metals, Inc.
(TR 6-3100)
New York (Long Island City 1)
Adam Metal Supply, Inc.
(Stilwell 6-7737)
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Strahs Aluminum Company, Inc.
(Browning 2-7000)
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Whitehead Metals, Inc.
(Watkins 4-1500)
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Adam Metal Supply of Rochester
(Locust 2-4260)
Rochester 1
Brace-Mueller-Huntley, Inc.
(Congress 6-6560)
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Whitehead Metals, Inc.
(Butler 8-2141)
Syracuse 1
Brace-Mueller-Huntley, Inc.
(Howard 3-3341)
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NORTH CAROLINA
Charlotte 6
Edgcomb Steel Company
(Franklin 5-3361)
Greensboro
Edgcomb Steel Company
(Broadway 5-8421)
OHIO
Cincinnati 14
Central Steel and Wire Company
(Avon 1-2230)
Cincinnati 37
Williams and Company, Incorporated
(Valley 1-5555)
Cleveland 28
A. M. Castle & Co.
(Axminster 2-7600)
Cleveland 14
Williams and Company, Incorporated
(Utah 1-5000)
Columbus 12
Williams and Company, Incorporated
(Axminster 4-1623)
Toledo 12
Williams and Company, Incorporated
(Greenwood 5-8661)
OKLAHOMA
Tulsa 13
Metal Goods Corporation
(Temple 6-2561)
OREGON
Portland 9
Pacific Metal Company
(Capitol 7-0693)
PENNSYLVANIA
Philadelphia 34
Edgcomb Steel Company
(Garfield 3-6300)
Philadelphia 33
Metal Supply Company
(Center 6-0220)
Philadelphia 40
Whitehead Metals, Inc.
(Baldwin 9-2323)
Pittsburgh 33
Williams and Company, Incorporated
(Cedar 1-8600)
York
Edgcomb Steel Company (47-1931)
RHODE ISLAND
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Greenville
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(Whitehall 8-3407)
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McCormick Steel Company
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McCormick Steel Company
(OR 2-6671)
Houston 1
Metal Goods Corporation
(Riverside 7-1110)
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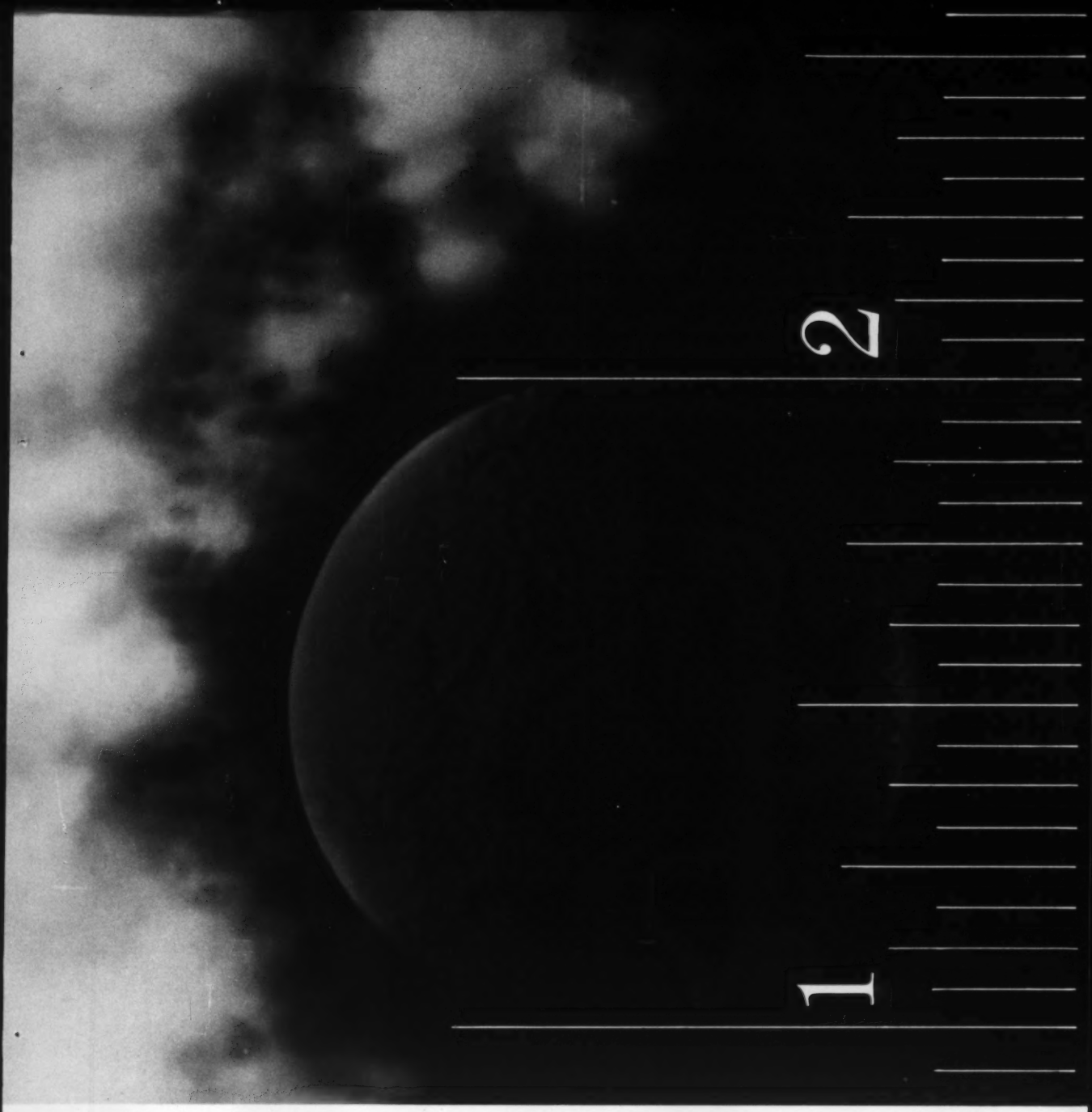
Salt Lake City 1
Pacific Metals Company, Ltd.
(Davis 2-3461)
WASHINGTON
Seattle 8
Ducommun Metals & Supply Co.
(Parkway 5-1500)
Seattle 4
Pacific Metal Company (Main 2-6925)
Spokane 4
Pacific Metal Company
(Keystone 5-3681)
WISCONSIN
Milwaukee 1
Central Steel and Wire Company
(Humboldt 1-5000)
Milwaukee 9
Steel Sales Co. of Wisconsin
(Hilltop 2-2020)

Call The Aluminum Man . . . his stock's the most complete!

Your Alcoa distributor sales representative—*The Aluminum Man*—maintains a warehouse bulging with sheet and plate; tube and pipe; extruded shapes; wire, rod and bar. His stock represents the widest range of aluminum products available from any distributor source. He can arrange for them to be slit, sawed or sheared to your specifications—furnish technical advice you may need on alloy selection and fabrication techniques. He's your fastest supply line for aluminum in any form when you need it. Your nearest Alcoa distributor is listed on this page, so give him a call . . . soon. Aluminum Company of America, 845-H Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM
DISTRIBUTED NATIONALLY

Call *The Aluminum Man* . . .
he's your Alcoa distributor
sales representative



OUR PRECISION IS LAW!

This is a world of rockets and satellites. Of thoughts to soar to the moon. In this world, Pratt & Whitney gages are the standards of precision! Today you must work to increasingly exacting tolerances, whatever your product, whatever the size of your company. Otherwise, your work is rejected internally or by your customers. You cannot afford to lose money on any phase of your gaging operations. You can make sure you don't. You can help win your battle for economic survival by insisting on Pratt & Whitney gages. The high quality, accuracy and longer life of these precision gages permit us to say: Our Precision is Law! You Are Not **Really** Measuring Unless You Are Using Pratt & Whitney Gages!

Pratt & Whitney

HEADQUARTERS IN AMERICA'S WAR AGAINST OBSOLESCENCE

machine tools / cutting tools / gages

A MAJOR INDUSTRIAL COMPONENT OF **FAIRBANKS WHITNEY CORPORATION**

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PRECISION AND MONEY WITHOUT

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No company can afford to defraud itself! It must use the best gages. Gages that accurately and consistently measure to exacting standards. Gages that decide whether products are accepted or rejected by you **or by your customers!**

Every component of a Pratt & Whitney gage is given the ultimate in skilled workmanship. Thus, the gage itself lasts longer. And it maintains its accuracy over this longer service-life span. This makes Pratt & Whitney Gages the best investment any company can make in its future, from the cold, hard standpoint of money saved!

No product is more accurate than the gage used to measure it. You must make sure that you get the finest. This means Pratt & Whitney! Behind every gage is P&W's 100-year experience in making the most precise gages that can be made. See us about your gage requirements **now!**

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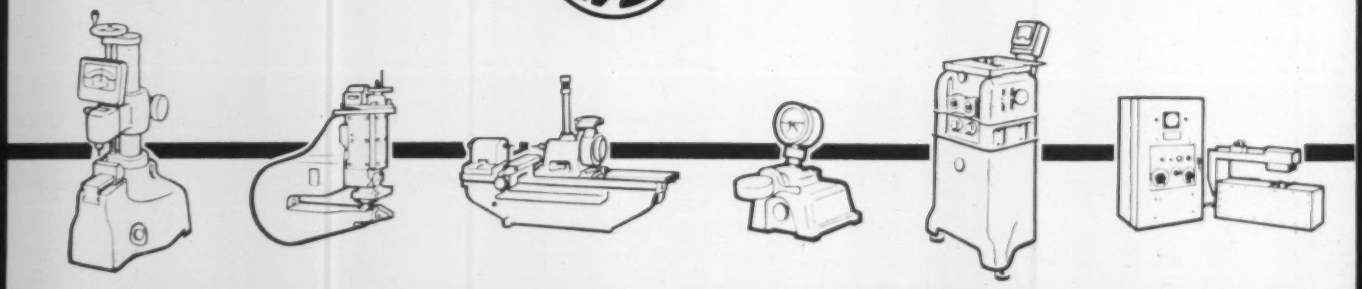
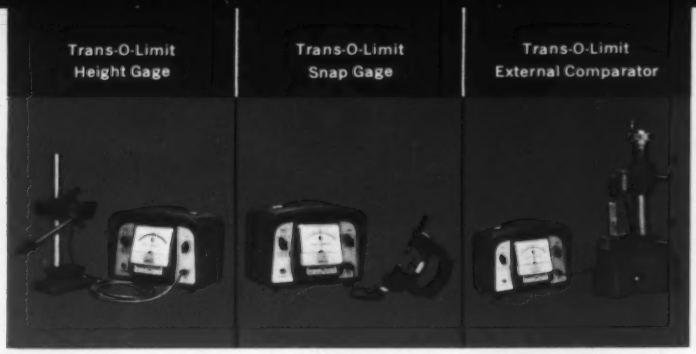




TRANS-O-LIMIT COMPARATORS

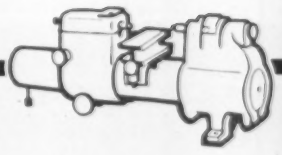
Here are three of an entirely new line of easily-portable, completely transistorized, precision P&W gages. This new line includes a series of Trans-O-Limit read-out cabinets which can be used with the Trans-O-Limit Height Gage, External Comparators, Cartridge Units, or Snap Gages. Developed and engineered to provide the ultimate in gaging stability, precision and reliability.

YOU CAN'T AFFORD **NOT** TO USE THE NEW AIR-O-LIMIT COLUMN GAGE! ***Fast . . . Versatile . . . Dependable***

This air flow gage is the latest result of P&W's constant research in the field of pneumatic gaging. A mechanically simple gage, with a longer life than other gages. Available with one or more columns. Modular construction permits you to use one combination of components today—an entirely different combination tomorrow. For use with a large variety of internal and external gaging attachments for rapid, consistently-accurate checking of a wide range of products. The time and money saved by using this revolutionary gage truly means that you can't afford **not** to use it!

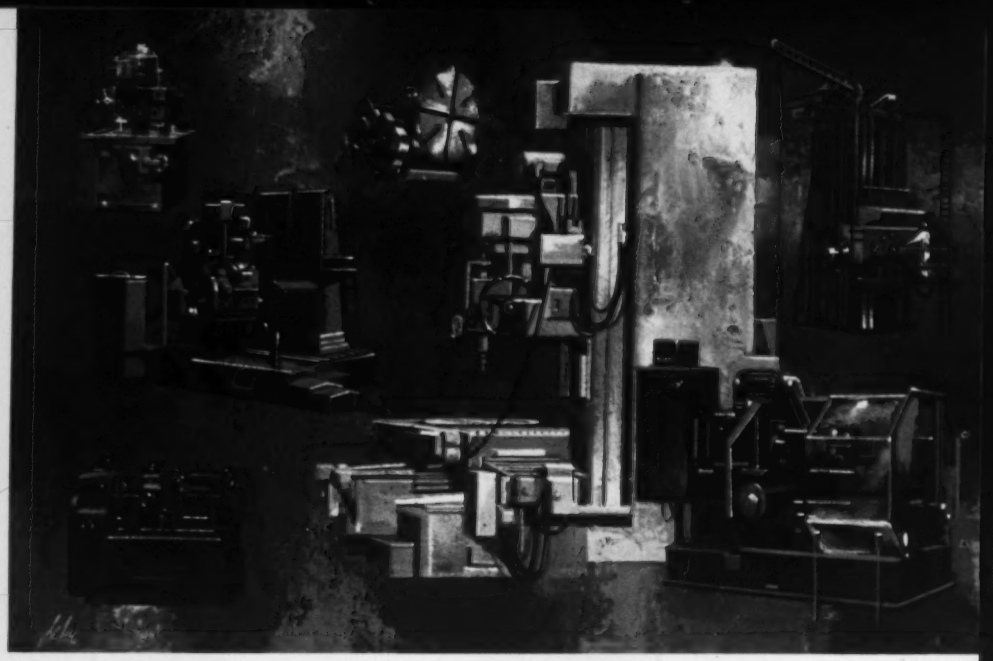
A COMPLETE LINE OF P&W GAGES . . .

In addition to the Trans-O-Limit and new Air-O-Limit Column gages, P&W offers the following types of gages: Basic Measuring Machines, Electro-Limit Comparators, Helical Path Analyzers, Continuous Gages, and X-Ray Gages. P&W has a standard or special gage for every application.



P&W MACHINE TOOLS

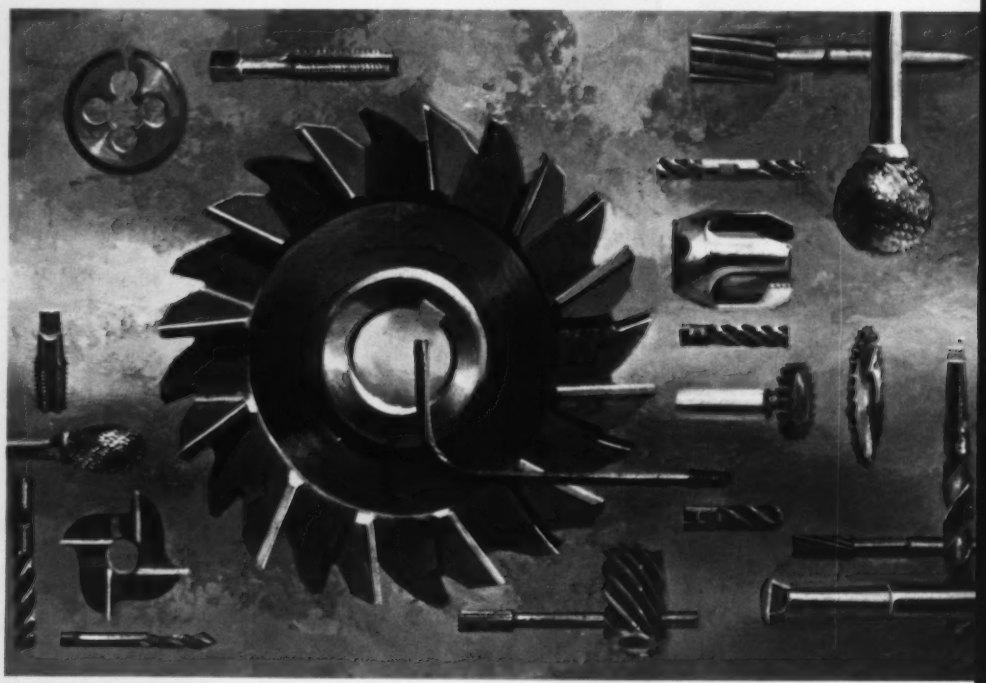
Are you producing prototypes, dies, large or small lots of production parts? Ultra-precision locating (to "tenths" accuracy)? Boring, profile milling (with or without masters)? All these and countless other problems can be solved with P&W machine tools at production line speed, efficiency and economy. Machines such as the world-famous P&W KELLER,® P&W JIG BORER, P&W ROTARY TABLE and P&W POTTER & JOHNSON AUTOMATIC TURRET LATHE are available with manual or numerical controls in a variety of models to fit your needs. P&W can also supply the MAGNETRACE PROFILER, SIM LATHE, INNOCENTI-MITSUBISHI MILL and the DIAFORM WHEEL FORMING ATTACHMENT...high grade performers all. For more information ask your P&W representative.



IN YOUR FIGHT TO **SURVIVE** YOU NEED THE FINEST WEAPONS

P&W's recently inaugurated policy of making P&W Cutting Tools and Conventional Gages available through factory-trained and selected Industrial Distributors makes personalized local service available to you . . . to simplify purchasing and speed delivery from local stocks.

P&W Cutting Tools include: Drills . . . Taps . . . Dies . . . Milling Cutters . . . Reamers . . . Burs, End Mills . . . in HSS and solid carbides.



MACHINE TOOLS – CUTTING TOOLS – GAGES • HEADQUARTERS FOR AMERICA'S WAR AGAINST OBSOLESCENCE

PRATT & WHITNEY

A MAJOR INDUSTRIAL COMPONENT OF

FAIRBANKS WHITNEY

PRATT & WHITNEY COMPANY, INCORPORATED, CHARTER OAK BOULEVARD, WEST HARTFORD, CONNECTICUT

Free your roll shops for redressing and leave the finishing to us

Is roll finishing straining the profitability of your roll shop operations? Many roll users have lowered operating costs by ordering finished rolls from National, leaving their shop facilities for redressing. They've found National's modern, fully equipped roll shop economically meets all requirements for precision finishing of plain or grooved rolls. They know experienced men such as sales representatives John Patton and Bill Mason, pictured above, shoulder the responsibility for roll quality from "spec" to finishing. On your next order for steel, iron or nodular iron rolls order them finished by National. You'll see why . . . NATIONAL'S THE GROWING NAME IN ROLLS.

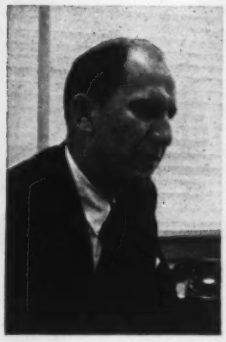
NATIONAL ROLL & FOUNDRY DIVISION
GENERAL STEEL INDUSTRIES, INC., Avonmore, Pennsylvania
General Steel Industries, Inc., General Offices: Granite City, Ill. Plants: Granite City, Ill., Eddystone, Pa., Avonmore, Pa.
Subsidiary: St. Louis Car Company, St. Louis, Mo.

No downtime problems

Udylite Full Automatic Rack Plating Machine photographed on April 4, 1961, at the Chromcraft Corporation. First placed in operation on October 1, 1950. 64′ 4″ long, 12′ 4″ wide, with a ceiling height of 15′ 1″. Racks are 30″ x 30″ x 60″ and tanks are 6′ 6″ deep, 56″ wide.

in ten years!

Udylite Full Automatic plates 13 miles of tubing per day for metal furniture leader!



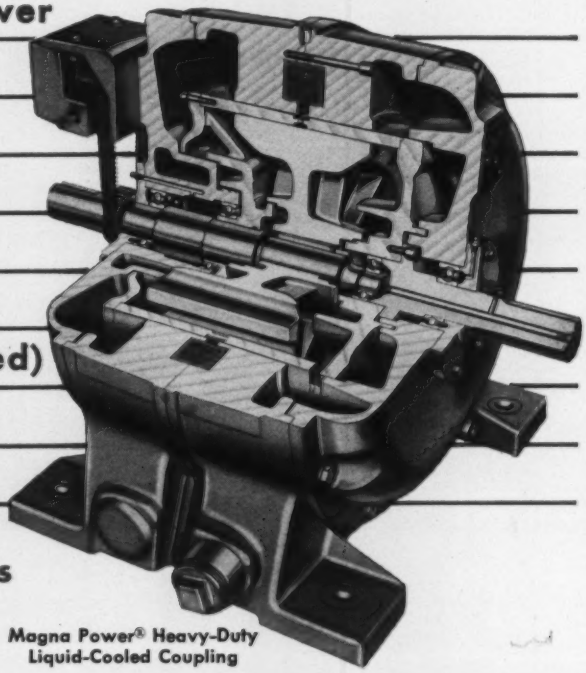
"Our Udylite Full Automatic Rack Plating Machine has more than met extremely heavy production schedules over the last 10-year period—without any significant downtime other than process change-over," states Mr. Irwin C. Keefer, Vice President of the Chromcraft Corporation, St. Louis, Missouri. ■ A leader in the metal furniture industry, Chromcraft Corporation produces more than 500 tables and 3,000 chairs per day. Tubular metal legs and frames are first bright nickel plated in a Udylite Incomparable "66" Process bath. Later they are chrome plated or finished with a gold aniline epoxy coating. ■ "We selected this return-type automatic on the basis of successful past performance of our other Udylite equipment. The need for increased production with uniform high plating quality, ease of operation and reduced maintenance requirements were additional considerations of importance," continues Mr. Keefer. ■ To find out how a Udylite Full Automatic, engineered to meet your specific plating requirements, can improve your production and profit picture, contact your local Udylite Representative, or write:

Udylite

THE UDYLITE CORPORATION
DETROIT 11, MICHIGAN

10 good reasons for choosing Dynamatic Eddy-Current Speed Control Equipment

1 Adjustable speed from AC power
2 Accurate speed control
3 Wide speed range
4 Rapid response
5 Low power loss
6 Simplified construction
7 Remote control (when desired)
8 Quiet, efficient operation
9 Low maintenance cost
10 No commutators, rings, brushes, or rotating coils



Magna Power® Heavy-Duty Liquid-Cooled Coupling

Using standard alternating current as a power source, Dynamatic Eddy-Current Couplings and Drives are the answer to practically all stepless adjustable speed requirements.

A wide range of standard and special control features may be obtained from electronic or transistorized magnetic amplifier control systems. The addition of an eddy-current brake to standard couplings or drives provides smooth, cushioned stops and controlled deceleration.

Dynamatic Eddy-Current Equipment is available in sizes from ¼ hp Ajusto-Spede Drives to heavy-duty Magnapower Couplings rated up to 20,000 hp—and larger.

Place your speed control problems in the hands of experts. Our representatives, located in all principal cities, are fully qualified to discuss your speed control problems and suggest Dynamatic Equipment that will do the best job for you. Call Dynamatic today—there is no obligation.

EATON

DYNAMATIC®

ORIGINATOR AND LEADING PRODUCER OF EDDY-CURRENT SPEED CONTROL EQUIPMENT

May we Send You Illustrated Literature Describing Dynamatic Eddy-Current Equipment

EATON DYNAMATIC DIVISION MANUFACTURING COMPANY
3122 FOURTEENTH AVENUE • KENOSHA, WISCONSIN

"Amazing Demonstration of Wire Rope Pliability!"

ACCO'S NEW HI-PLI SLINGS HANDLE LIKE HEMP AND STRAIGHTEN OUT WHEN RELEASED

- ***So pliable it can be tied in knots***
- ***It makes fast, easy work of any lifting job***
- ***It combines the pliability of hemp with the strength of steel***
- ***It's practically kink-proof—and completely free of crankiness***
- ***HI-PLI slings last longer—can be used over and over again***

Twist them, knot them, bend them—and HI-PLI slings always return to their original shape. This amazing pliability comes from ACCO's arrangement of six ropes laid around one. HI-PLI slings also have ACCO's patented Dualoc endings which double-lock the sling ends. They stay clean and pleasant to handle, too—thanks to their durable Galacco finish which resists rust.

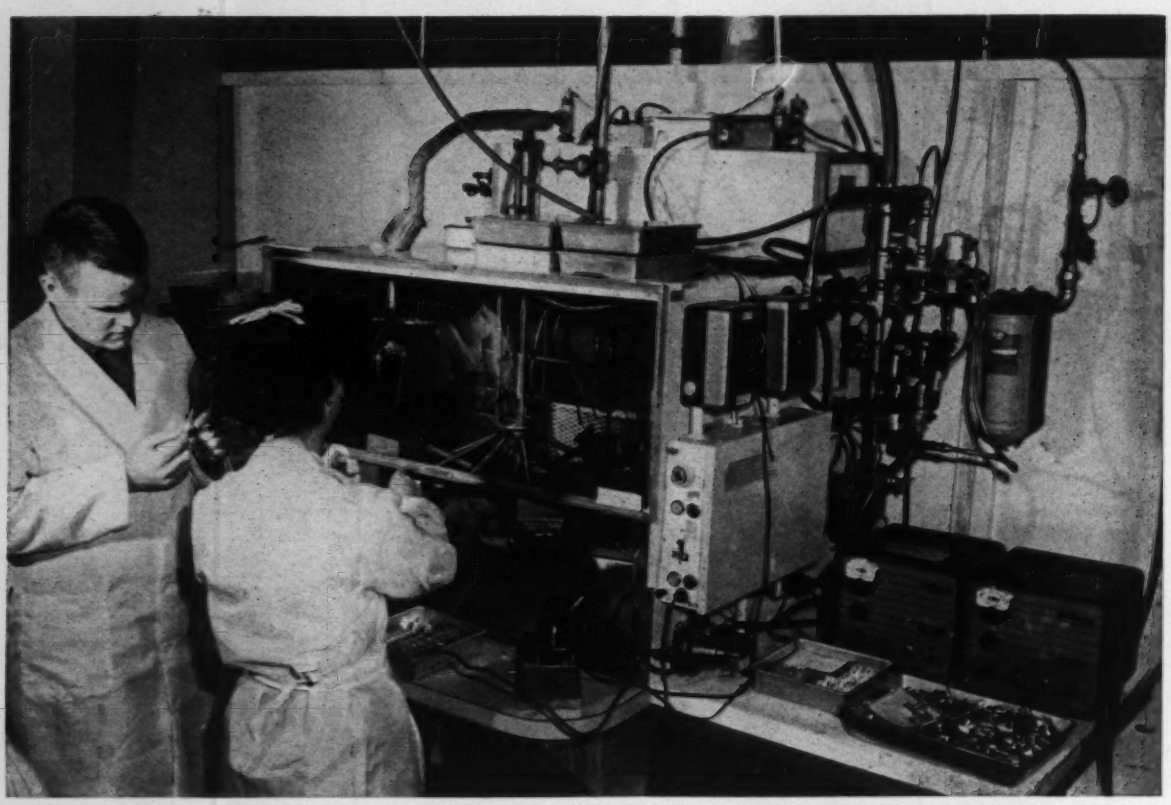
HI-PLI slings, like all ACCO slings, are registered safe. This means they have been factory proof-tested at twice load-carrying capacity before they are given an ACCO tag and certificate of registration.

Ask your distributor for Hi-Pli slings or write us at Wilkes-Barre, Pa., for our new Bulletin **DH-532B** giving full details about the Hi-Pli Sling line.

HI-PLI ACCO Registered® SLINGS

Wire Rope Sling Department • American Chain & Cable Company, Inc.

Wilkes-Barre, Pa., Atlanta, Chicago (Melrose Park), Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn. • *In Canada:* Dominion Chain Company, Ltd., Niagara Falls, Ont.



Charles Parke, production engineer at the Potter and Brumfield plant, a division of American Machine and Foundry Company, spot checks a part while operator removes remaining components from the cleaning system.

"WE MAGNIFY EACH PART 10 TIMES... DON'T FIND GREASE AFTER A NIALK® TRICHLOR BATH"

Workers handle delicate microminiature relays with utmost care in Potter and Brumfield's "white room." Yet some contamination with dust and grease is inevitable.

"We assume everything is contaminated," continues Charles Parke, production engineer—and orders all of the minute parts cleaned with Nialk TRICHLOREthylene.

100,000 parts between cleanouts.

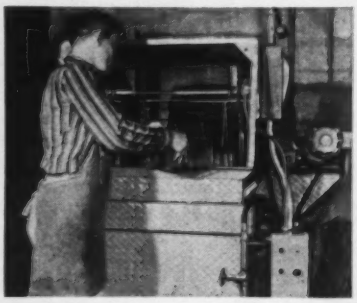
According to C. R. Stone, Director of Production, Nialk Trichlor removes the last bit of film on the metals. Potter and Brumfield degreases magnetic iron and nickel silver, running about 100,000 parts through between cleanouts.

They tried another vapor degreasing solvent, but "it didn't do the job Nialk Trichlor does. It wasn't distilling right and it wasn't doing the cleaning job."

Though much metal goes through every degreasing bath, this company doesn't have to titrate or run other tests.

Flush and vapor degrease—one trichlor

Potter and Brumfield uses one grade of trichlor for both flushing and vapor degreasing, considers this an important benefit.



And Mr. Stone concludes, "Hooker should get a large share of credit for the quality of parts produced by Potter and Brumfield."

You can get the same dependable cleaning with nonflammable Nialk TRICHLOREthylene.

Hooker technical experts will help you set up your system. Then they'll check back with you regularly to make sure your flushing or degreasing operation stays trouble-free.

Talk to your Hooker Chemical distributor. He'll gladly help you with your problems and questions.

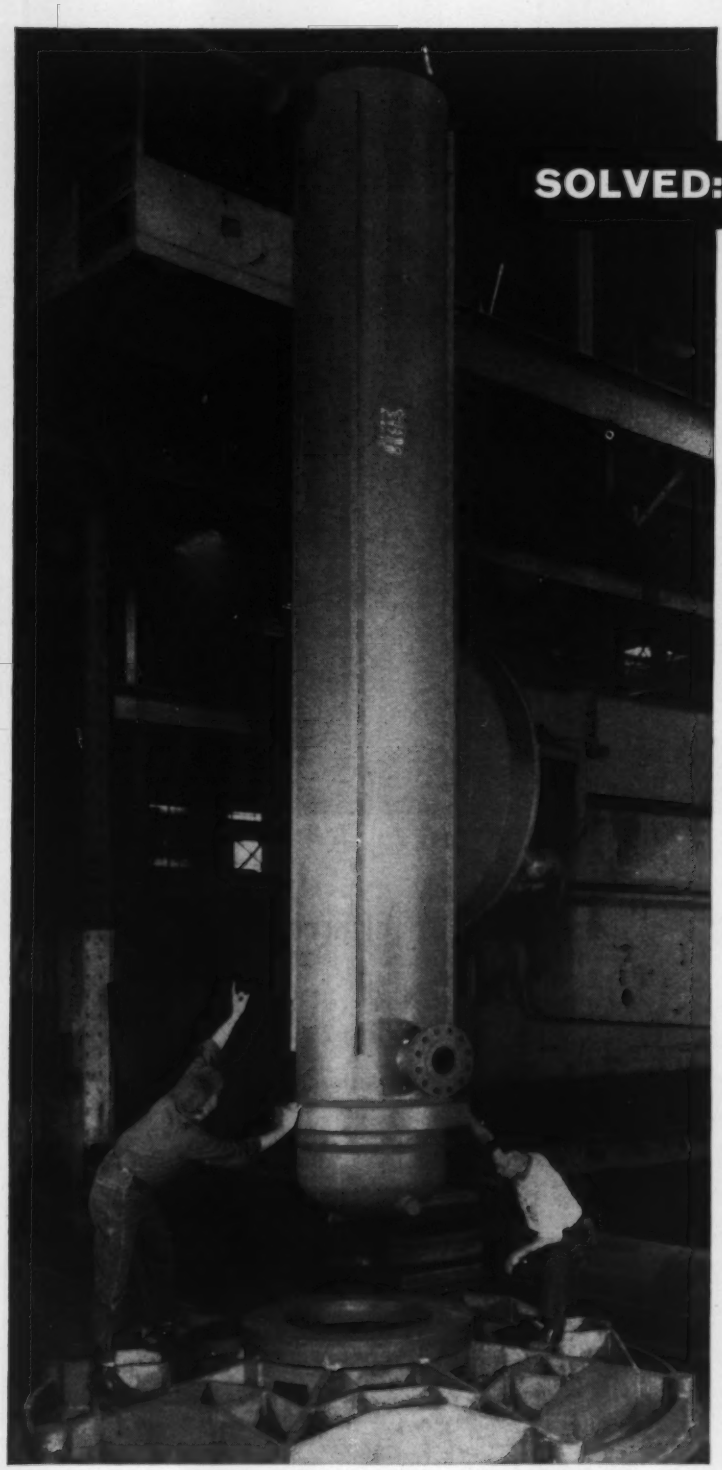
Or write us direct. We have years of experience to put at your disposal.

HOOKER CHEMICAL CORPORATION

1208 UNION STREET, NIAGARA FALLS, NEW YORK

HOOKER CHEMICALS PLASTICS

Sales offices: Buffalo, Chicago, Detroit, Los Angeles, New York, Niagara Falls, Philadelphia, Tacoma, Worcester, Mass. *In Canada:* Hooker Chemicals Limited, North Vancouver, B.C.



Blaw-Knox workmen assembling one of two constant pressure type accumulators built for two of America's largest steel mills. Sandusky supplied the straight cylindrical sections for both.

SOLVED: by Sandusky Centrifugal Casting

Blaw-Knox chooses 10-ton

SANDUSKY CASTING

for giant slabbing mill

When an 18½-foot cylinder was needed for a new giant Universal slabbing mill built by Blaw-Knox Company's East Chicago (Indiana) Works for a well known steel mill, they found that the most practical and economical way to meet all requirements was with a Sandusky Centrifugal Casting.

This 10-ton carbon steel cylinder, 32" O.D. with a 3½" wall, functions as an accumulator in the mill's hydraulic roll balancing system. Essentially a pressure vessel, it simultaneously supports the ram and ballast weighing 226 tons—the weight required to develop constant operating pressure of 1000 p.s.i.

"Only a dimensionally stable, one-piece cylinder could perform satisfactorily in this service," a Blaw-Knox official asserted. *"Distortion could lead to binding, loss of pressure and costly downtime. Sandusky's ability to produce this heavy walled cylinder in one 18½ foot length met all our requirements of cost, stability, and strength."*

Sandusky cylinders up to 33 feet long —from 7" to 54" O.D.— and in a wide range of ferrous and non-ferrous alloys —may well be the answer to *your cylindrical problems,* too.

Write to us at Sandusky, Ohio. Ask for latest Bulletin #200.

SANDUSKY CENTRIFUGAL CASTINGS

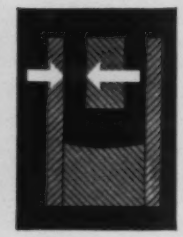
FOUNDRY & MACHINE CO.

9901

SANDUSKY, OHIO—Stainless, Carbon, Low-Alloy Steels—Full Range Copper-Base, Nickel-Base Alloys

Control panel of a Carpenter consumable electrode (Consumet) furnace. Electronic circuits maintain positive arc control and precise electrode movement to assure the ultimate in refining.

Where *Carpenter's* "big inch" makes a mile of difference in alloy quality



The "big inch" in Carpenter's consumable electrode (Consumet®) furnace is the extra space between the consumable electrode and the mold wall. (Conventional furnaces of this type are almost ⅓ smaller at this vital point.) The "big inch" in Carpenter's furnace provides more exhaust space to carry off harmful gases. It also gives Carpenter technicians more precise vacuum control during the arc strike as well as during the entire melting process. As a result, you get cleaner, more uniform alloys from core to surface. Segregation and variation in grain size are minimized . . . to assure you consistent, predictable performance from your vacuum melted alloys. The "big inch" is only one of many exclusive Carpenter quality controls in consumable electrode, MEL-TROL® and vacuum-induction-melted (VacuMeltrol®) specialty steels. Ask your Carpenter representative for the full story behind these alloys and how they benefit you.

Carpenter steel

you can do it ***consistently*** better with Carpenter Specialty Steels for specialists

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Export Dept., Port Washington, N.Y.—"CARSTEELCO"
Alloy Tube Division, Union, N.J.
Webb Wire Division, North Brunswick, N.J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

new

M-S-A® ONE-HALF-HOUR CHEMOX®

Try this new lightweight oxygen breathing apparatus on for size. Note the simplified design. Save on low operating costs. Watch the wearer's quick acceptance. Here's why:

PRESSURE RELIEF VALVE

Fully automatic — no manual operation required.

FACEPIECE

Monocular lens CLEARVUE* Facepiece provides unobstructed vision.

HEADBANDS

They're made of strong, long-lasting nylon.

BREATHING TUBE

Just a single short one. But close convolutions greatly extend its length for full head movement.

TIMER

Fully recessed for compactness. Rings continually for 17 seconds.

CANISTER

Round, simplified, inexpensive. Rated at 30 minutes. Materially reduces operating costs.

INSTANT OPERATION

An optional unit is now available for instant operation even at temperatures below zero.

CANISTER HOLDER

Easy acting lever holds canister securely in place—cannot open accidentally.

BREATHING BAG

"Picture-frame" type. Encircles the canister completely, providing full unrestricted flow.

HARNESS

Also strong, long-lasting nylon. Rides comfortably and lightly without hampering.

For a demonstration or technical bulletin on this new respiratory protective equipment, contact the nearest MSA sales engineer. Or write: Mine Safety Appliances Company, Pittsburgh 8, Penna.

*Trademark

MSA

MSA backs up its label with selection, quality, research, experience

Best rest comes from wire spring coils—hundreds of them laced together in an innerspring mattress unit like this at Kay Manufacturing Corporation's High Point, N. C., plant. Pittsburgh Steel supplies Kay with 8-15½ gage upholstery spring wire for innersprings and high tensile wire for exclusive Kay-Arc sinuous springs for furniture.

PITTSBURGH STEEL UPHOLSTERY WIRE HELPS PUT THE "ZZzzzz" IN KAY SLEEP PRODUCTS

To assure restful comfort to the people who use his products, there's no rest for a manufacturer of innersprings.

Because he's dealing with one of the most basic human wants—personal comfort—the innerspring producer dare not be caught napping on product quality. But he can take comfort in Pittsburgh Steel Company's high carbon wire.

Kay Manufacturing Corp. of Brooklyn, N.Y., does—as do many other spring manufacturers.

One of the largest suppliers of springs and other components to bedding and furniture manufacturers, Kay depends on Pittsburgh Steel for substantial quantities of automatic knotting and coiling quality upholstery spring wire, and high tensile wire for sinuous furniture springs.

Why? Because Kay knows it can count on Pittsburgh Steel for high carbon wire with the consistency of size, tensile strength, ductility, toughness and soundness that form the starting point for innerspring superiority.

Plant Manager Martin Tuska of Kay's High Point, N.C., plant explains:

"To produce innerspring units with uniform characteristics, it's absolutely necessary that the wire forms and sets into springs that are identical in height, pressure, diameter and pitch.

"The wire can't have any hard or soft spots. We double wrap knots over the second turn on one or both ends of the coil. That takes high carbon wire with high, uniform ductility because the wire is twisted twice around its own diameter.

● **Needs toughness**—"It has to have special toughness, too. That is, it must have the strength and ductility to be compressed countless times without showing fatigue—to provide the deep, unchanging resiliency that only an innerspring can give.

"I'd say that the quality and performance of Pittsburgh Steel's high carbon wire, from coil to coil, is very good."

Using upholstery spring wire from 8 to 15½ gage, Kay's High Point plant produces several hundred assembled innerspring units per day for many of the country's largest manufacturers of mattresses, dual-purpose sleep equipment and furniture.

Featuring the highest degree of

Compressed 2 inches, 5-turn innerspring of Pittsburgh Steel upholstery wire must respond with pressure reading of 6½ pounds; must hold height within ⅛-inch after stress relief.

Uniformity of Pittsburgh Steel wire assures long production runs on coiling and knotting equipment. Five-inch, five-turn coils are held to ½-inch tolerance in pitch and diameter.

Ductility and tensile strength of wire get their toughest test during knotting. Kay double-knots innersprings, automatically twisting wire twice around its own diameter.

uniformity, units are assembled on automatic lacing machines in all standard sizes and coil counts from springs that are individually stress relieved immediately after coiling.

Through a quality control system based on programmed inspections, as well as spot checks, Kay maintains identical product uniformity through all seven production plants from coast to coast.

By making extra efforts to assure its customers a product of highest quality, Kay provides further proof of the superiority of innerspring bedding and furniture.

Steel spring construction, unlike slab-type bedding and furniture, offers the manufacturer-assembler versatility and wide flexibility in:

- **Design of finished product.**
- **Control of resiliency, density and degree of comfort.**
- **Selection of special finishing materials and components.**
- **Promotional features for attracting retail buyers.**

If you're a bedding and/or furniture manufacturer, take advantage of these benefits. They're available only with innersprings.

Or, if you're a bedding and furniture spring manufacturer, take advantage of the benefits inherent in Pittsburgh Steel Company's high carbon wires. The same experience in producing wire for special applications that helps Kay Manufacturing Corp. is available to you, too, from Pittsburgh Steel. Just contact one of the offices listed at the right.

Twenty completed innerspring units compress into a bale 11 inches thick—little more than twice the thickness of a single unit. Baling reduces bulk in shipping yet units retain full depth, resiliency when unpacked.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

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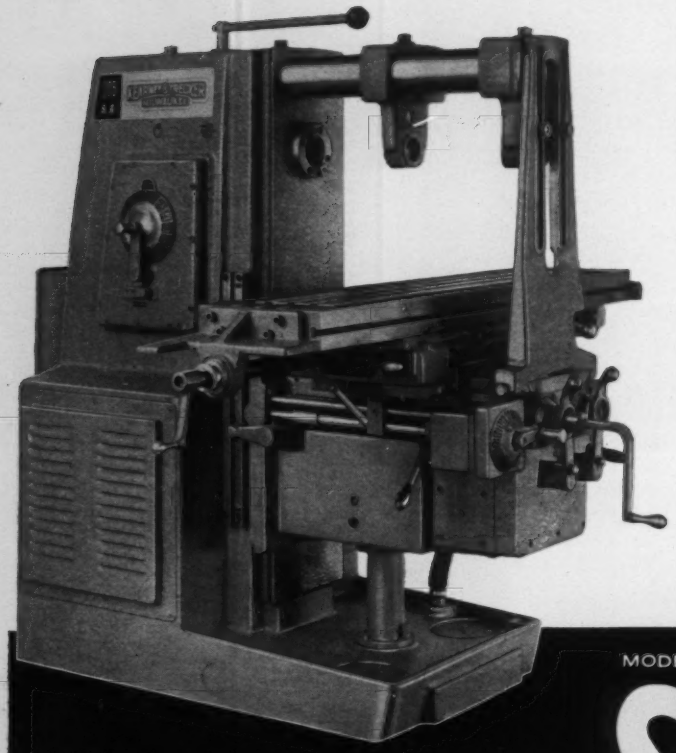
Chicago	Dallas	Detroit	New York	Tulsa
		Houston	Philadelphia	Warren, Ohio

Steel



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the ALL NEW

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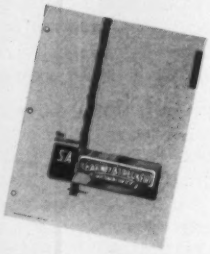

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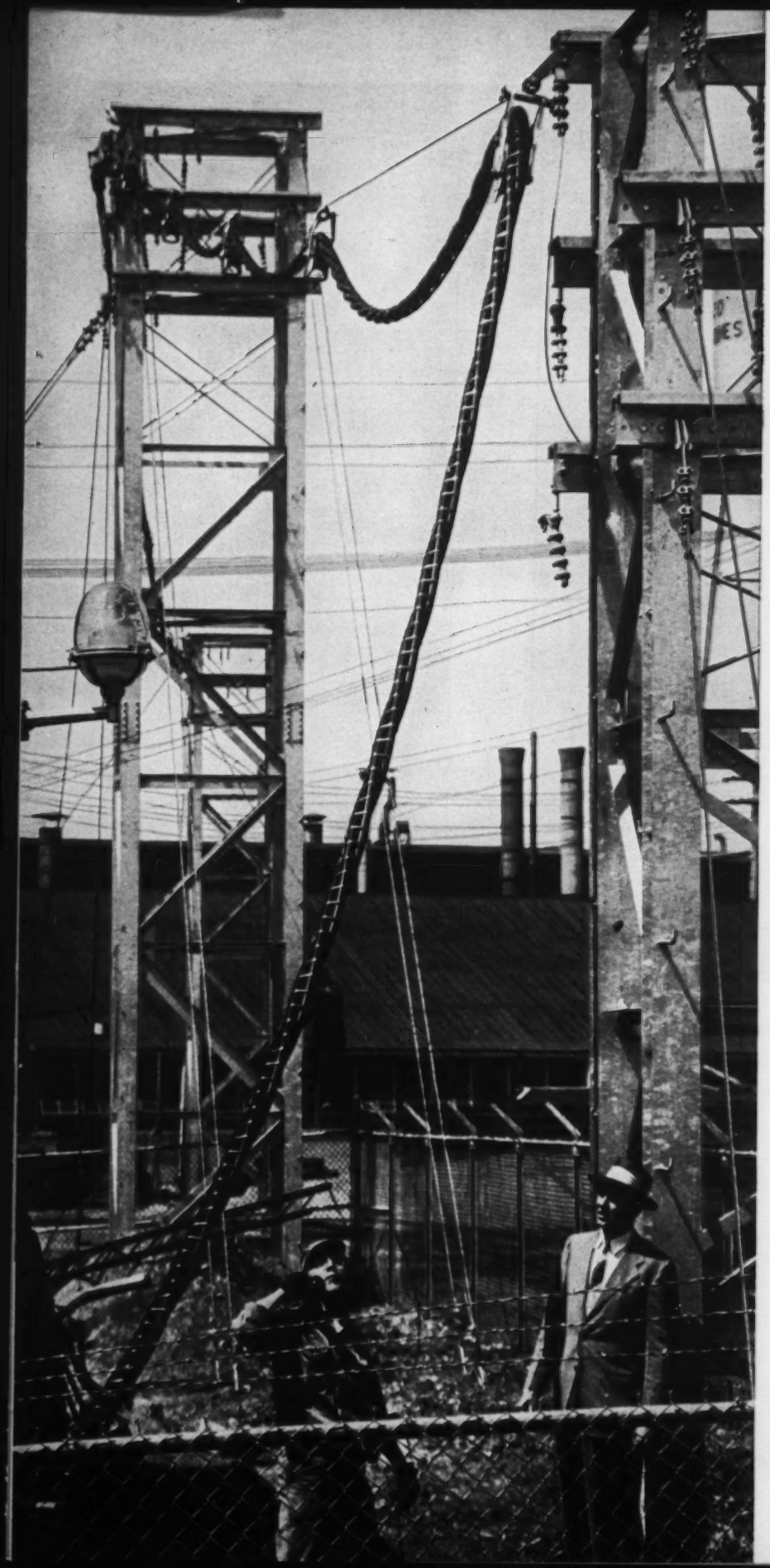


GO UP TO BRING COSTS DOWN WITH ANACONDA AERIAL CABLE

Anaconda's compact, self-supporting factory pre-assembled aerial cable is installed as a *single unit*. No field assembly is required—and no lashing operation. In plants where the maze of pipes and other underground structures often make installation of ducts or buried cable costly or difficult, this cable solves the problem.

It's fast, easy to install—particularly in crowded areas. You need only one assembly even for three-phase circuits. No special ducts, crossarms, or insulators are required.

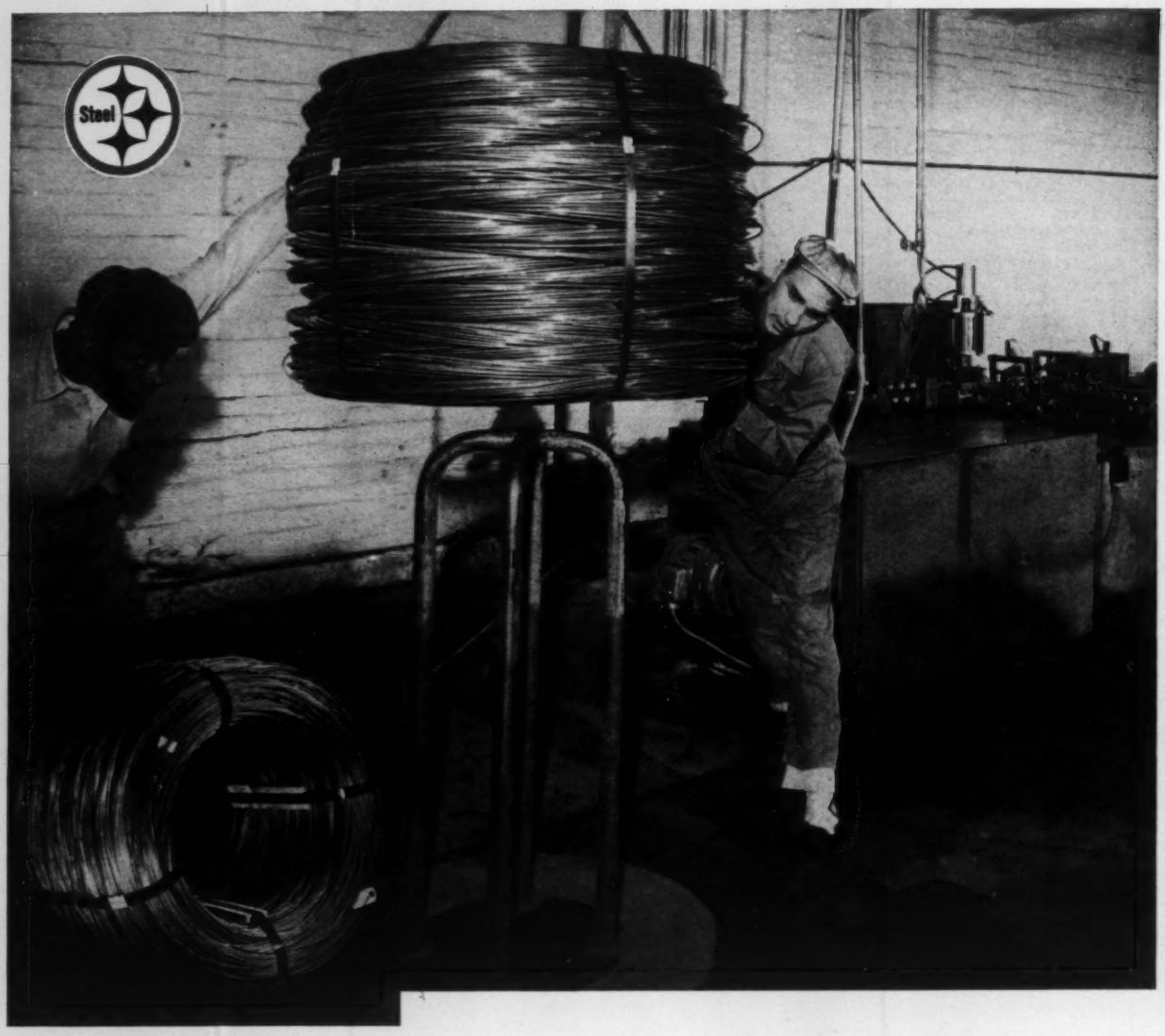
You can attach Anaconda aerial cable directly to a pole or building-attached bracket.

Type AB butyl insulation and Neoprene jacket affords resistance to moisture and heat. For the full story, call the Man from Anaconda today. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York; Department EFL-1-S. 61262

ASK THE MAN FROM

ANACONDA®

FOR SELF-SUPPORTING AERIAL CABLE



CF&I Shaped Coils and Stem-Paks® are Packaged for Your Production

SHAPED COILS

Here's a quote from one satisfied user, the president of a wire fabricating plant:

> "A CF&I salesman examined our operation and suggested that we use CF&I Shaped Coils as opposed to the small coils we had previously used. We now stop our machine only once to start a new coil, instead of 10 times a day. We save nearly 2 hours, and have increased our production by about 20%."

CF&I-Wickwire Shaped Coils contain between 1500 and 2500 lbs. of top quality wire in one continuous length . . . are bundled with four steel straps and, when necessary, wooden supports to insure that the coil is not distorted.

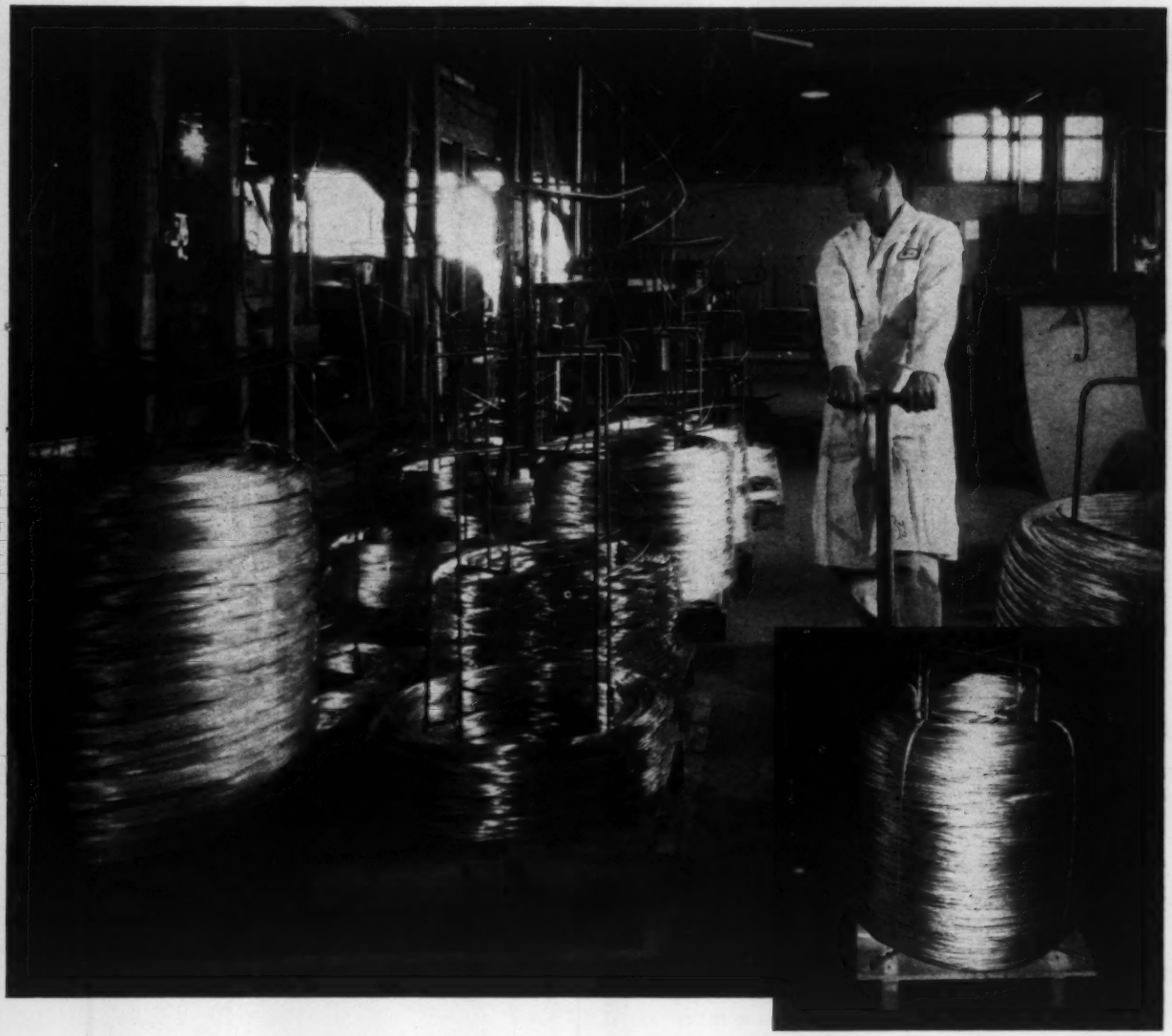
OPERATING ADVANTAGES: Increased production, reduced material-handling costs, less wire scrap and less storage space needed.

DISPOSABLE STEM-PAKS

The experience of a typical user:

> "Up to 75% of our production downtime was caused by using too many small coils. Stem-Paks hold 500 to 1000 pounds of continuous wire. These larger packages keep each machine running as much as 1½ hours longer per day. Stem-Paks allow for free unwinding, without snarling. CF&I Stem-Paks have increased our production 50%."

Stem-Paks hold 500-1000 lbs. of wire in one continuous



length . . . consist of a center core attached to a wooden base mounted on 4″ runners.

AVAILABLE IN: Sizes for 14″, 17″ and 21″ center core (inside diameter).

OPERATING ADVANTAGES: Ease of handling, reduced scrap losses, increased production and less storage space.

Only CF&I offers a total of ten different wire packages. You've just read how two of these packages have increased the production efficiency of leading manufacturers. One or more CF&I-Wickwire Wire packages can do the same for you. Our engineering staff will be happy to study your operation and recommend the type that best meets your requirements. For complete details, write your local CF&I sales office.

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STEELWELD SHEAR WORKS 3400 HOURS A YEAR

"Serves Art Iron, Toledo" for Over 10 Years

This shear provides sharp straight, accurate cuts every stroke. Here it is cutting a ¾ inch steel plate.

All shearing at the Art Iron & Wire Works, Inc., a 200-employee plant in Toledo, Ohio, is done on a Steelweld Pivoted-Blade Shear rated for ¾" x 12'-0" mild steel. This is the only shear in the plant.

Art Iron manufactures ornamental iron and structural steel items to order and also has a large steel warehousing operation. An inventory of over 10,000 tons of steel of every kind, size and shape is maintained to serve any need. This work keeps the Steelweld busy cutting a great variety of steel items varying in thickness from 18 gauge to ¾ inch.

The Steelweld feature most valued by Art Iron is the knife-clearance adjustment. They know that to obtain the best cut with the least burr and distortion, it is essential to have the clearance set to suit the plate thickness. Because this adjustment is so easy and fast to make, their shear operators make it automatically as a part of the regular shearing routine.

Knife life is very satisfactory. This is attributed in large part to the shear operators consistently using the proper knife clearance. Despite the large tonnage of steel cut, the knives usually require regrinding only once in a period of four months or longer.

The Art Iron, Ft. Wayne, Indiana, plant also has a Steelweld Shear. Its purchase several years ago was influenced by the success with the machine in Toledo.

Prefabricated industrial buildings are among the many items made by Art Iron. These require a large number of plates for footings, gussets, splices, etc., all of which are sheared on the Steelweld.

Write for free copy of catalog No. 2011

STEELWELD

PIVOTED BLADE *Mechanical and Hydraulic* **SHEARS**

Steelweld Machinery includes: Mechanical & Hydraulic Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

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Continuous-Cast Brass . . . a Scovill innovation now proven over 20 years . . . is different and very much better than ordinary brass because it starts with a different and better concept.

In the Continuous Casting Process, consecutive carefully formulated melts of the alloy are intermixed in the holding furnace, thus assuring far more uniform chemical composition of metal in the casting. Through precise control of pouring temperature, rate, etc., Continuous Casting also produces billets or bars of exceptional soundness and inherent quality, remarkably free from casting imperfections or impurities.

In all subsequent processing, these inherent good qualities in the metal are never lost. Ultra-modern Scovill continuous cold-rolling procedures . . . our detailed inspections and quality control . . . simply enhance and protect the "cast-in" excellence provided by the Continuous Casting Process.

Why not let us help you bring these outstanding advantages to the betterment of your product . . . perhaps at a cost that will show economies over your present materials and methods. Especially if you are planning new products, Scovill Technical Service offers practical help in selecting materials for utmost cost-efficiency.

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DENISON HydrOILics

How **AUTOMATIC ELECTRIC** uses **DENISON** Multipress to form featherweight phone parts requiring unusually high...

PRECISION

PRECISION FORMING *of ultra-thin telephone diaphragms from .003" aluminum roll stock is done on this 50-ton Denison Multipress at Automatic Electric, Northlake, Ill. Operator removes finished parts with air tube to prevent damage to delicate edges. Completed diaphragms are shown at right.*

PRECISION control and smooth, cushioned hydraulic pressure by this Denison Multipress solved a critical production problem for Automatic Electric, subsidiary of General Telephone & Electronics.

This small aluminum diaphragm is a vital component of Automatic Electric's new 810 telephone receiver. Weighing just a fraction of an ounce and only .003" *thin*, this fragile part proved extremely difficult to produce by ordinary pressing methods. But the job was a *natural* for this 50-ton Multipress—*a giant with a delicate touch.*

In one operation it automatically blanks, forms and perforates the diaphragms from .003" aluminum roll stock. Because of the extra rigidity and stability—as well as accurate control—finished parts come through in perfect shape, well within the .001" tolerance specified. No distortion of the thin diaphragm edges . . . no damage to the costly dies.

It's typical of how Multipress speeds production . . . reduces rejects . . . cuts costs on an endless range of pressing jobs. To learn what Multipress can do for *you*, ask your Denison Production Specialist about a **M**ultipress **A**nalysis **P**rogram in your plant *now*. It can help you **MAP** new ways to boost efficiency and save money in your pressworking operations.

DENISON ENGINEERING DIVISION
American Brake Shoe Company
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The superiority of the vast number of products that are — and can be made from Roebling Cold Rolled Flat Spring Steel is a fact known throughout all industry.

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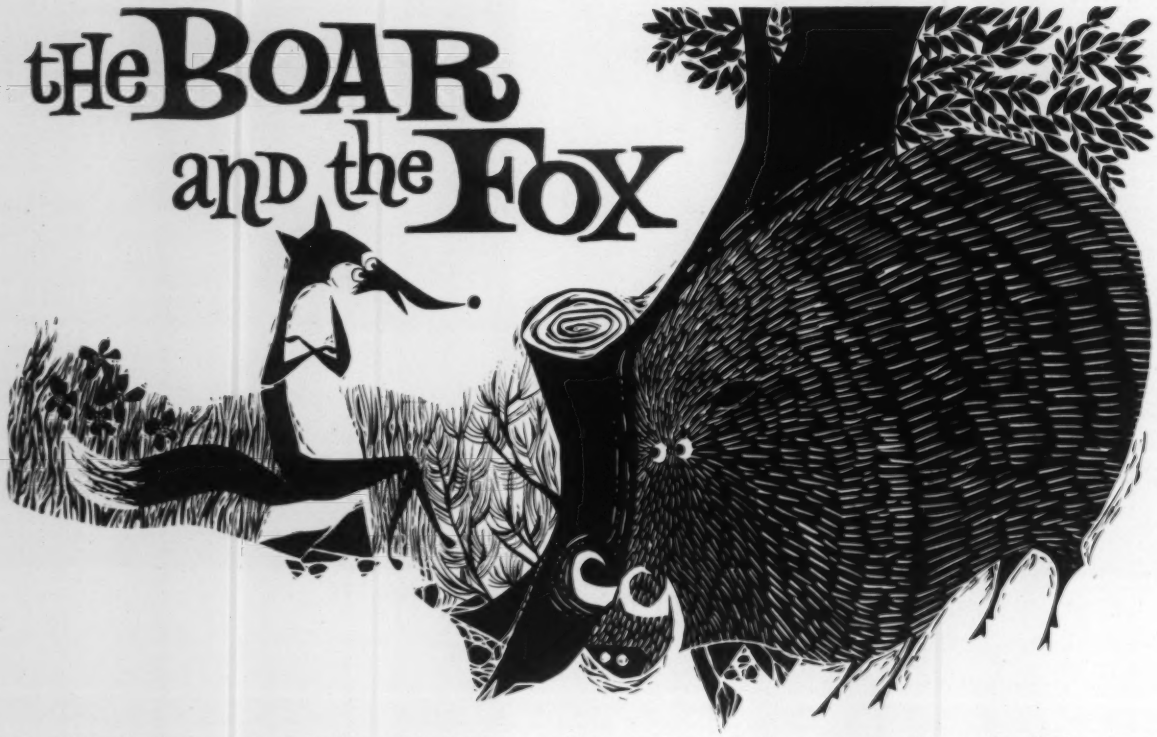
the BOAR and the FOX



A wild boar was sharpening his tusks against a tree. A fox passing by asked the boar why he did so. "I can see no reason why you sharpen your tusks," said the fox. "There are no hunters around, or any other dangers near us that I know of." // The wise old boar kept rubbing his tusks and replied: "Quite true, my friend, but when danger does come, I will have other things to do than sharpen my tusks."

moral: Today's planning is tomorrow's performance.

While you plan tomorrow's tooling, take a sharp look at your cylinders. Reliable performance from such components reduces machine downtime—and costs per unit. Hydro-Line cylinders have two new advantages to help keep your machines performing at peak efficiency, tomorrow *and* today.

"Duraton" rod seals and wipers in our Series N2 hydraulic cylinders are formed from a fluoro-elastomer which resists 400° F heat—is compatible with virtually all hydraulic fluids. (Optional, at slight additional cost, on Series R2 cylinders.)

Chrome-plated barrel ID's for Hydro-Line air cylinders resist scoring, even under critical side loads. Hard chrome-plating also eliminates corrosion and minimizes wear to help you avoid costly downtime and missed shipping dates.

Look in *Sweet's Product Design File* for dimensions of our standard stock cylinders, ready for off-the-shelf delivery. Check the address of your nearest Hydro-Line representative. Then ask him to help you select the correct cylinder for hydraulic applications to 5000 psi and air operations to 200 psi. Or, phone the factory direct: 815 TRemont 7-5711.

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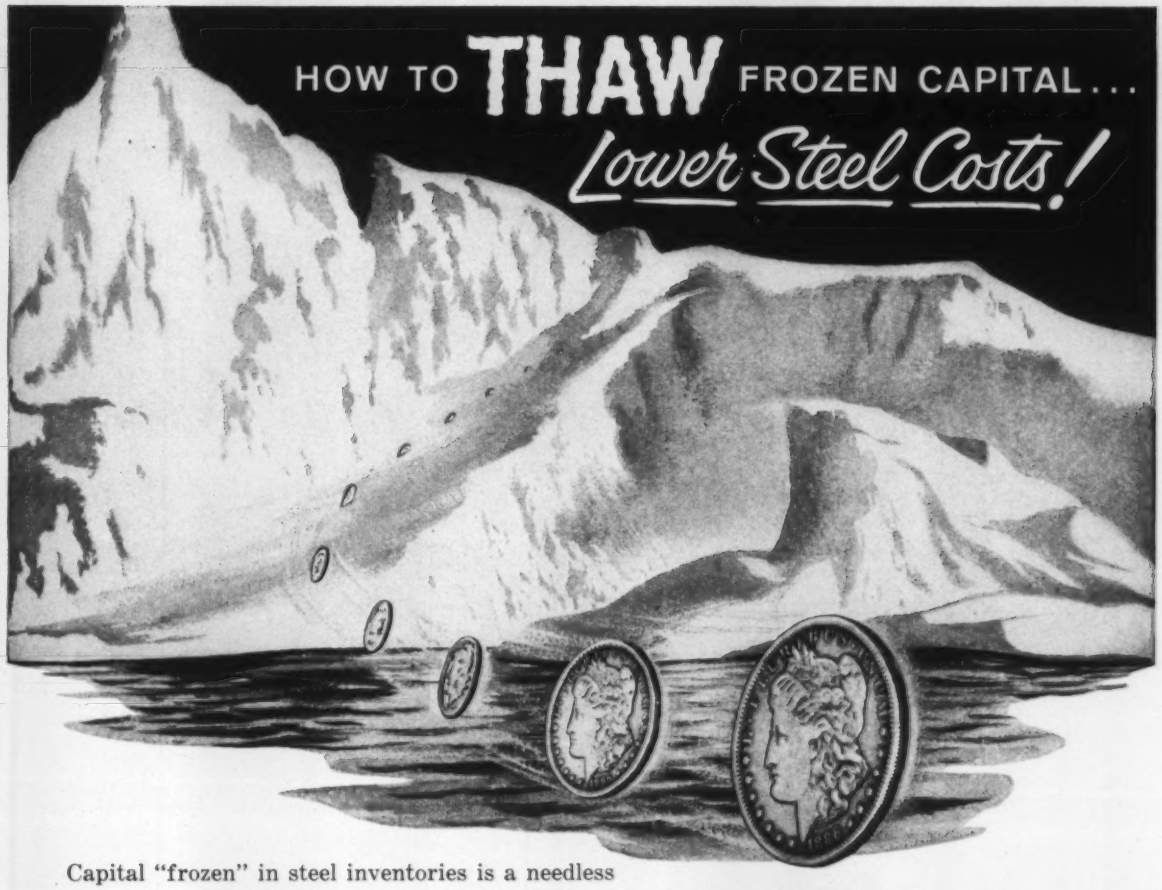
5604 PIKE ROAD • ROCKFORD, ILLINOIS manufacturers of high- and low-pressure hydraulic cylinders • heavy-duty air cylinders • adjustable-stroke cylinders • dispensing cylinders • intensifiers • single-acting cylinders • booster cylinders



Capital "frozen" in steel inventories is a needless expense...you incur additional costs as long as the steel remains in your possession. And, these costs must be added to the purchase price...to get the *true cost* of steel ready for use.

Review the check-list—use it to estimate the expense you save by having Frasse deliver the steel you need...on a job-by-job basis.

By working with Frasse stocks you get quick deliveries...broad selection...and technical assistance. You'll find this modern method of inventory management a definite convenience...and an economical way to have steel on hand...*when you need it.*

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HELPS YOU AVOID THESE COSTS OF POSSESSION

- ☐ cost of Capital tied-up in Inventory
- ☐ cost of Space and Storage
- ☐ cost of Labor Handling
- ☐ cost of Scrap and Wastage
- ☐ cost of Obsolescence
- ☐ cost of Taxes and Insurance
- ☐ cost of Capital invested in Material Handling and Cutting Equipment

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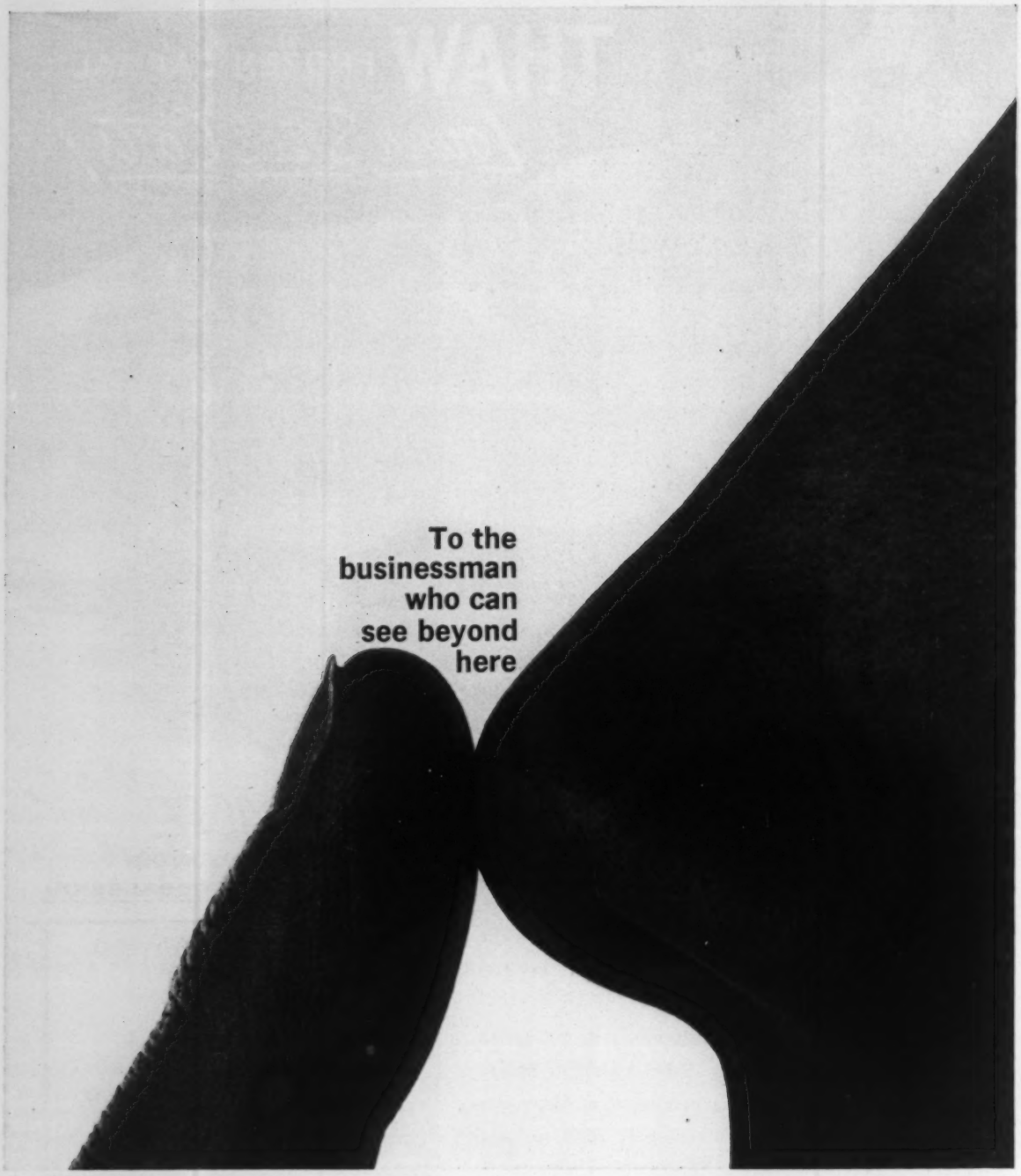

Our population is growing, moving, shifting. And more people than ever need more goods—opening new areas in which to build your business, to provide more jobs in America's growing economy.

But how? And where? These key questions are answered best by marketing research, often costly and time-consuming. But it doesn't have to be. And it isn't—if you consult your U. S. Department of Commerce. On file, it has a 135-million-dollar fund of marketing data—vital and valuable up-to-date facts. Yours for the asking.

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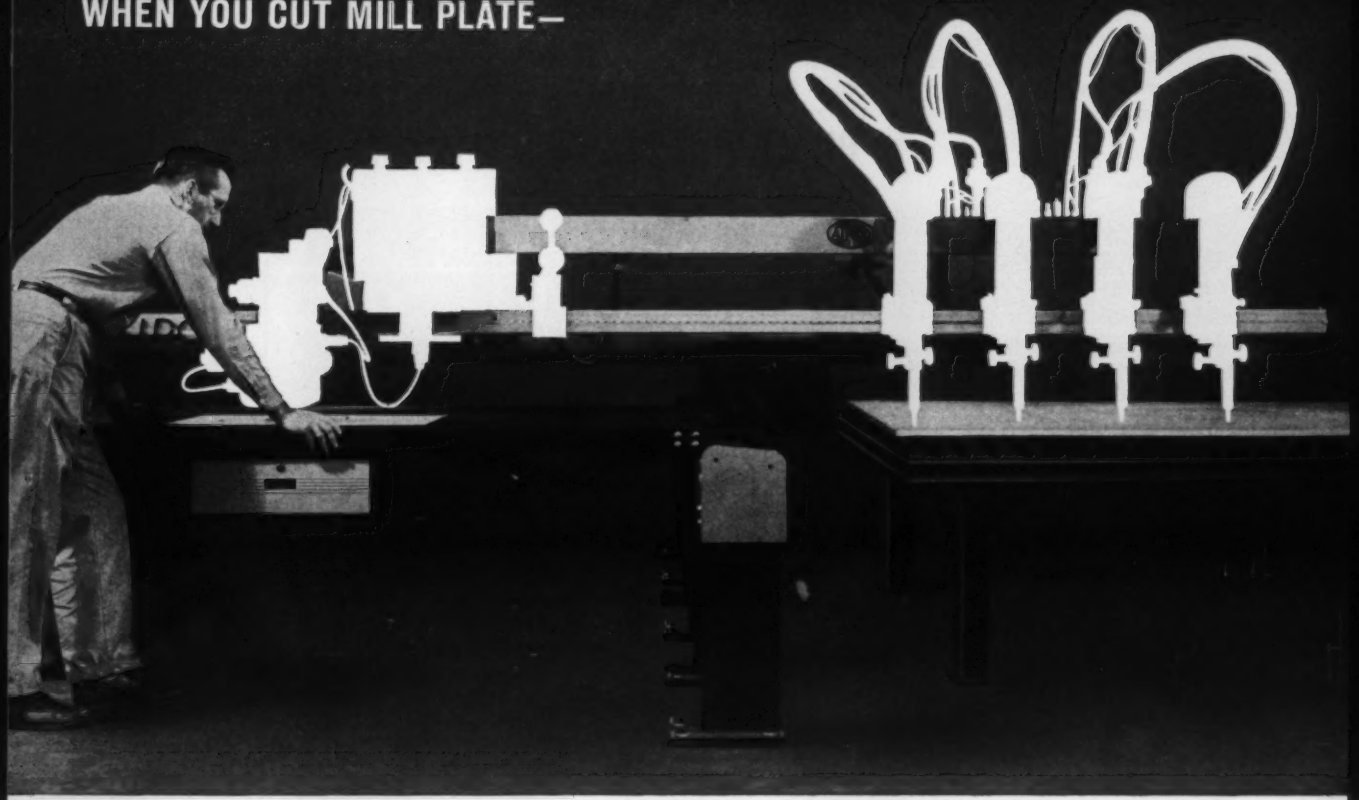
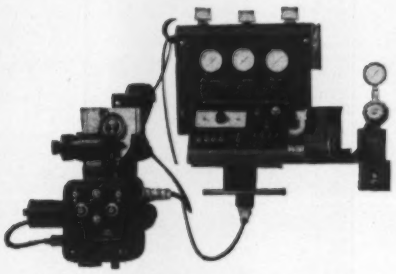
Take advantage of the many ways in which your business can grow. In new U. S. markets. In foreign markets. In developing new products and services. In attracting new industry to your community. Just write or phone the U. S. Department of Commerce Office of Field Services in your city, or Washington 25, D. C. Your U. S. Department of Commerce is always ready to help you grow with America!

NOW'S THE TIME TO GET GROWING IN A GROWING AMERICA!

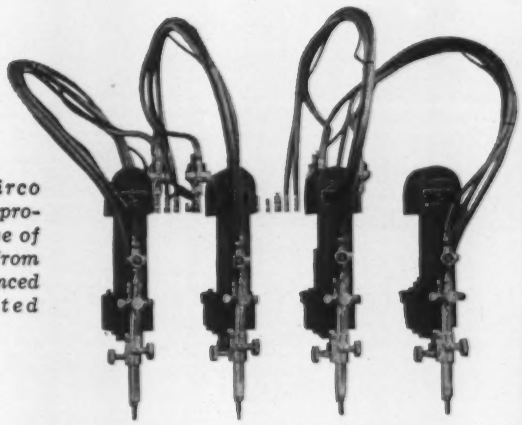
WHEN YOU CUT MILL PLATE—



AIRCO'S NATURAL GAS FLAME CUTTING SYSTEM OFFERS EVERYTHING YOU NEED



Above: new Airco Linagraph. Airco produces every type of flame cutter — from portables to advanced large automated systems.



Cutting bull gear blanks, ship plates, hangers, machine frames, or any other shape?

Equip with an Airco natural gas flame cutting system. You'll cut at lower cost. You'll reduce warpage. You'll cut so precisely that most pieces need no finishing. Moreover, the Airco system will work even when gas service pressure is low.

Main reasons why:

(1) Only Airco natural gas flame cutting systems are built from a component line that is complete and matched. Exact needs are met.

(2) Multi-torch Airco machines are based on the exclusive pantograph design. Tracing head moves only torches and gas system; carriage is driven independently. No extra burden here.

Airco makes everything you need for your natural gas flame cutting operation. Call Airco—*where the big idea is teamed with unexcelled research and experience.*

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QUALITY...TODAY'S DIFFERENCE BETWEEN PROFIT AND LOSS!

These are the days of the 12-month warranty . . . extended service guarantees! Never before has Quality been so important.

That's why we suggest you consider Barnesdril Honing Machines for your surface finishing operations. Because of the quality inherent in these precision-made machines, they impart that "extra" touch of quality to your products at cost-cutting production speeds.

Our detailed story — backed by 35 years of specialization in honing — is yours free! Ask for catalog 200.

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Honing Machines/Production Units
Filtration Units/Drilling Machines

BARNES DRILL CO.

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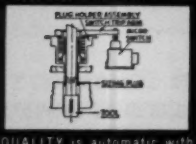
DETROIT OFFICE • 13121 PURITAN AVENUE

QUALITY is insured with correct hone feeds . . . made possible with this easy-to-set infinite hone feed control.

QUALITY at high production rates means exact spindle speed rates . . . selected with a flick of the fingers.

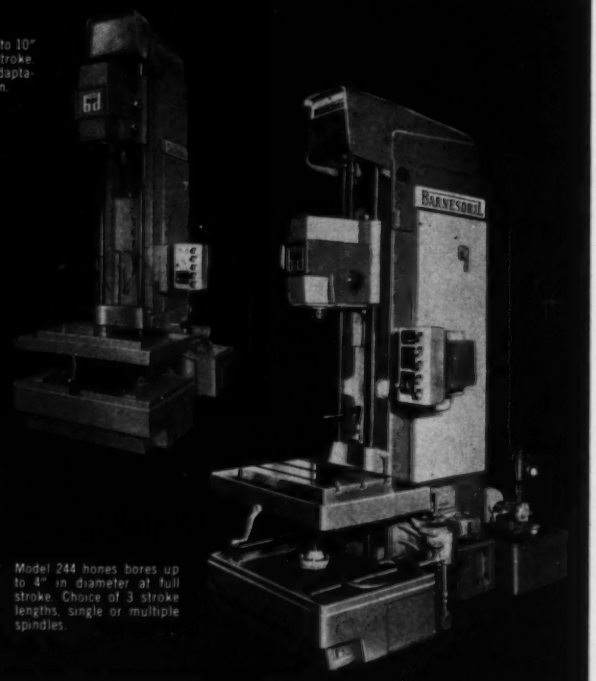
QUALITY results from correct reciprocation speeds . . . easily selected with this dial or, on the Model 122, a calibrated scale.



QUALITY is automatic with Plugmatic bore-to-bore sizing . . . production size consistency maintained to .0002".

Model 3010 hones up to 10" diameter at full stroke. Choice of 4 strokes. Adaptable for full automation.

Model 122 hones bores up to 2" in diameter at full stroke. Available in 1 or 2 spindles and a variety of fixtures and tables.



Model 244 hones bores up to 4" in diameter at full stroke. Choice of 3 stroke lengths, single or multiple spindles.

OUR FULLY EQUIPPED JOB HONING DEPARTMENT CAN HONE ANYTHING UP TO 25 FEET IN LENGTH. WRITE FOR DETAILS!

What's *your* problem? If it involves forgings, rings or castings for special applications—where high temperature, corrosion or high stress limit the usefulness of ordinary steels—try Standard. We're specialists in superstrength and stainless alloys, and if it's *quality* you want, that's been our hallmark for more than a century and a half.

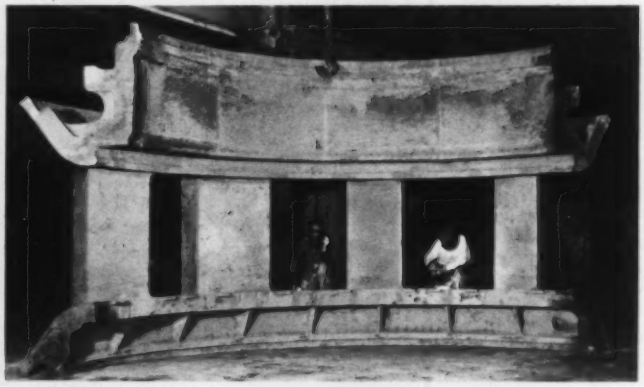
Electric furnace, vacuum degassed steels, vacuum melted alloys, aluminum and titanium are specialties at Standard. We serve leading industries throughout the nation. To name a few just to give you an idea: shipbuilding, rubber, missiles, paper machinery, machine tools, railroads, turbines, large and small.

EXOTIC STEELS FROM STANDARD

QUALITY CONTROL IS SECOND TO NONE AT STANDARD. Quality control at Standard is maintained by the most accurate, up-to-date testing equipment available. Laboratory facilities operate day and night to support our metallurgists, shop foremen, mill and machine operators—as well as plant management and, of course, our customers.

STANDARD'S OPEN-DIE FORGINGS SUPPLY NATION'S LEADING INDUSTRIES. Steel and nonferrous alloys can be worked in Standard's forge shop, including some hard-to-work metals such as titanium and super alloys. It can turn out forgings from 15 to 52,000 lb.; up to 45 inches in diameter; and up to 60 ft. in length. Major products include rotors and wheels for turbines, propeller shafts for ships, rolls for sugar, printing and rubber industries.

Standard's hundreds of customers represent every major industry in the world. Metal components of carbon and alloy steels, super alloys, and nonferrous alloys such as aluminum and titanium are supplied by Standard for an endless line of products. What particularly impresses our customers however, is the unique, personalized service we provide. See for yourself—bring your next problem to Standard.



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PIONEERS IN ROLL-FORGED RINGS . . . STANDARD. Standard's craftsmanship in forming metal rings for heavy industry dates back to 1856. The first all-forged weldless rings were produced in volume for the first time in 1870—at Standard. And much of the development work in forging weldless rings of high-alloy steels, aluminum and titanium has been done in Standard's Ring Department.

Standard Steel Works Division

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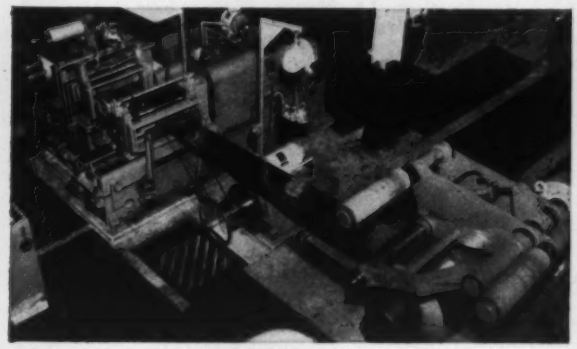

SECO Slitting Installation, Superior Steel Division, Copperweld Steel Company, Carnegie, Pa.

is automatic—start to finish—with a SECO *Slitting Line*

SECO STEEL MILL EQUIPMENT

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- Combination Edging and Flattening Lines
- Tension Reels for Strip Polishers
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- Multiple Strand Pull-out Rolls and Take-up Frames
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- Traverse Reels for Narrow Strip
- Steel Coil Up-enders
- Scrap Ballers

Affiliated with Lee Wilson Engineering Co., Inc.

Every operation in this *complete* slitting line by SECO—from entry to exit of coils—is fully automated. It was specifically designed and built by SECO to meet the maximum performance requirements of the Superior Steel Division, Copperweld Steel Company, Carnegie, Pennsylvania.

SECO's staff of experienced sales engineers, specialists in production problem solving, are prepared to show you how you can get "predictable performance" in *your* operation—whatever your requirements. Call or write today. West Coast representative: United Machine Tool Company, Los Angeles, California.

STEEL EQUIPMENT COMPANY

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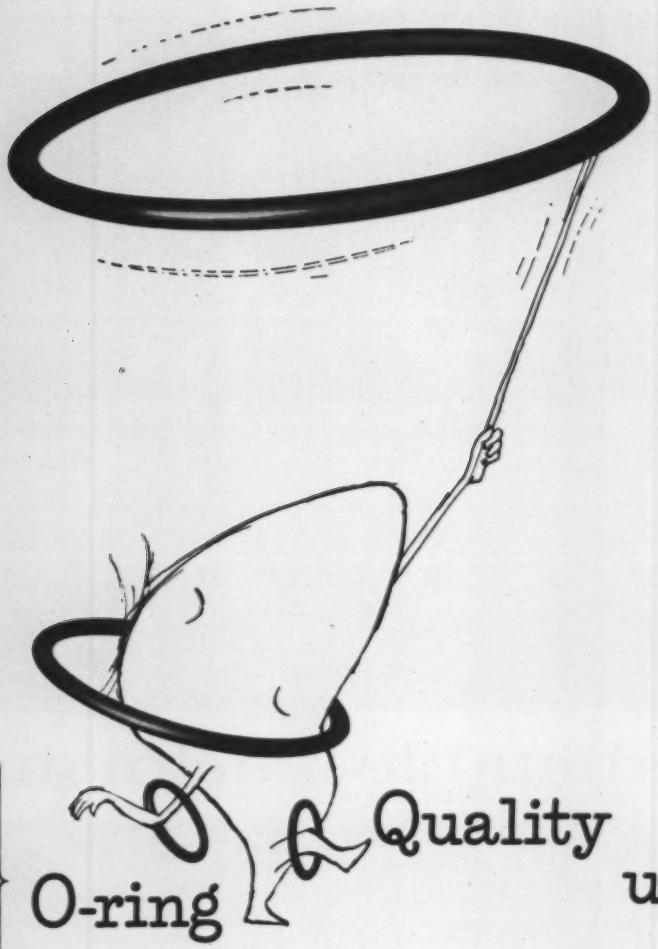

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"For want of a nail..." The same burden may often fall on the tiny O-Ring. In overall product reliability the smallest parts are vital to performance. That's why IPC uses the famed "custom" approach in designing and manufacturing O-Rings.

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P4

Productivity Gap

U. S. manufacturers, faced with wage costs two to eight times those of foreign producers, traditionally have relied on the miracle of productivity to remain competitive. And in the past, the miracle has saved our position as the leading exporter of the world.

Now, data developed by the United Nations indicate the U. S. is lagging in the productivity race. Since 1953, U. S. manufacturing output per manhour has gained about 25 per cent. But Japan has increased manhour output by 70 per cent, Italy by 65 per cent, and France by 58 per cent. Of all important overseas competitors, only the United Kingdom has had a slower productivity growth than that of the U. S.

Output per manhour depends less on human effort than it does on investment in modern plant and equipment and in research and development. The fact that our growth in manhour output in the last eight years has been slower than that of major overseas competitors does not necessarily mean their absolute productivity is higher than ours. Our industry was more highly mechanized at the beginning of the 1953 base period.

The relative faster growth in manhour output does mean that we are losing our advantage in productivity, and rather rapidly. It means that the much higher wage costs here are becoming a greater disadvantage. It suggests that unless we accelerate our productivity growth, we will find it increasingly difficult to compete in the world market.

And compete in the world market we must.

Behind the productivity gap lies an investment gap in modern plant and equipment. As a nation, we are spending relatively less for capital equipment than our foreign competitors are.

The basic reason for this, of course, is this country's policies which tend to discourage modernization. Our archaic depreciation setup is a prime example.

We suggest we need a crash program to update our laws and policies. It must encourage the modernization of our industrial plant so that we can compete more effectively in the expanding world market and provide more jobs for Americans.

And this is no time for a slow-motion crash program.

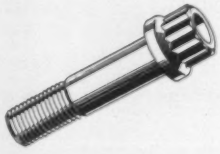
Walter J. Campbell

EDITOR

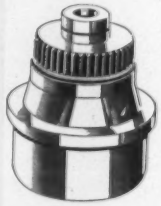
SPS RESEARCH is

Photoelastic study on a Polariscope in the SPS Laboratory for advanced research proves that new UNBRAKO *Hi-Life Thread Root distributes stresses evenly over a large, smooth radius, doubling fastener fatigue life and increasing tensile strength.*

INDUSTRIAL FASTENERS like this UNBRAKO Socket Head Cap Screw are produced to a dynamic reliability standard as a result of SPS research. The SPS line includes a limitless variety of self-locking screws, locknuts and precision fasteners for everything from massive machinery to the most minute products.



AIRCRAFT/MISSILE FASTENERS like this bolt are produced to ultra-high performance standards at SPS. Today's lightest, strongest fasteners in standard and special designs are products of SPS. Research and development work includes titanium, beryllium and other lightweight, high-strength exotic metals.



NUCLEAR COMPONENTS like this cap for a core housing are held to almost unbelievable dimensional tolerances. The nuclear energy field depends on SPS for threaded fasteners, control rod drive mechanisms, motor tubes, core components, instrumentation housings and many other essential parts.

rewriting the book on threads

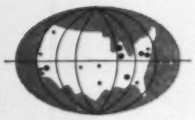
Out of the SPS laboratory has come a whole new concept in thread design. Engineers created a radiused thread root based on known laws of stress. A precision contour now eliminates sharp corners, or "hot spots", where stress concentration formerly caused fatigue cracks. The streamlined root provides a smooth pattern of stress distribution.

The reliability of this research-inspired thread root is achieved directly on the production line. SPS makes and maintains its own thread roll dies. Skilled machine operators check die performance as often as every 50 pieces.

Gauges at production stations are calibrated daily against standards set by the SPS Metrology system . . . industry's most advanced thread control facility.

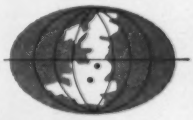
UNBRAKO socket screws . . . the advanced fastener for the '60's . . . are but one outstanding example of the tireless SPS effort to create reliability through research. Born in the laboratory . . . formed to strict production quality standards . . . these improved fasteners are now in use throughout industry.

This is SPS reliability at work for you. Write for a 20-page booklet called, "The Root of the Thread", which presents a comprehensive description of this development.



SPS

where reliability replaces probability



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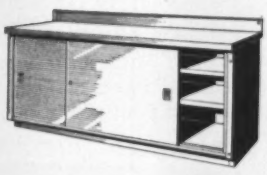
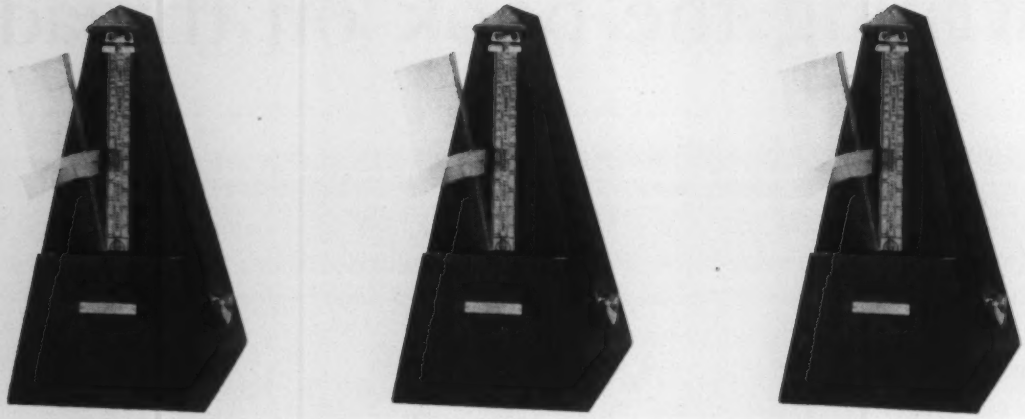


SHOP EQUIPMENT for industry and schools is made to the same superior quality standards as other SPS products. The Hallowell line offers broad coverage of standard and special needs in work benches, shelving, and similar equipment. Ruggedness and space efficiency are well identified with Hallowell.

OFFICE FURNITURE like this handsome Columbia Nine-to-Five unit sets an office apart with distinctive styling and color combinations. The complete line includes efficiently designed, durable steel office furniture, plus special units, a wide choice of smart chairs, filing cabinets and accessories.

CAPACITORS FOR ELECTRONICS bearing the IEI trademark are widely used for subminiature circuitry and transistorized applications. This SPS company makes both aluminum and tantalum capacitors, including the lightest and smallest per given capacitance in the industry, to the highest quality standards.



POSITIVE DUPLICATION—EVERY TIME!

With these three metronomes—or with a thousand—the time interval you choose can be positively duplicated time after time after time. And with these three PD° surface wheels—as with *all* CINCINNATI PD GRINDING WHEELS—you'll get the same kind of Positive Duplication *every time*!

HERE'S WHY . . . IN 36 STEPS

There are 36 unvarying quality control steps in Cincinnati's unique PD manufacturing process. Right from the start with the choice of the "grains" that go into a wheel, PD procedures involve exacting checks and re-checks. Every grain characteristic—from size, cleanliness, absence of foreign matter, color, magnetic content, to bulk density before and after blending—must fully satisfy extraordinary PD specifications, which are followed throughout in all 36 rigid controls.

RESULT: PREDICTABLE PERFORMANCE

You can depend on the uniformity of PD WHEELS—for each reorder wheel gives you exactly the same good job as the original. Production goes up and stays up. Costs go down and stay down. This is the promise—and performance—of Positive Duplication.

CALL CINCINNATI TODAY

Solve your grinding problems with the help of our Cincinnati-trained specialists. Their wide experience in job set-ups and grinding operations is at your service. Just call your CINCINNATI PD GRINDING WHEEL Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

PD POSITIVE DUPLICATION

CINCINNATI° GRINDING WHEELS

°Trade Mark Reg. U. S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

Reuther Sings Old Refrain: 'Open the Books, GM'

CAN CARBUILDERS afford wage cost increases without putting through price boosts?

That's the basic question, not one of "excessive" profits that Walter Reuther claims would be proved if General Motors Corp. "opens the books."

• **Old Ploy**—Mr. Reuther's move is a propaganda tactic, one he last used just before the 119 day auto strike of 1945-46. At that time, the issue died before the National Labor Relations Board could rule on it. GM is again the target because it's big and because more information on its pricing methods is available than for other makers.

The propaganda technique is designed to divert attention from the possibility that the UAW's demands may force higher auto prices. The strategy raises the question of how Detroit prices its products.

• **Pricing Cornerstone** — All the auto companies use the standard volume concept—the financial key to the entire business.

Standard volume is the number of cars a company must sell to pay all its direct and indirect costs, plus a built-in profit of 15 to 20 per cent on capital investment, after taxes. The formula is different from net return on stockholder investment which is affected by nonautomotive operations.

• **Divisional Responsibility** — Each car division is responsible for returning a preset percentage of profit on the share of company capital it uses to produce and market its cars. That capital is called an asset base, which includes gross working capital and net fixed assets. It's established from plant capacity, past sales patterns, market forecasts, and other factors. The standard volume needed to meet the return on the asset base is less than the division's full production capacity. It should be achieved in 180 working days annually.

Standard volume figures are closely guarded. The only data ever made officially available were dredged out of GM by the 1958 Senate Antitrust & Monopoly Subcommittee. In 1957, GM reported its corporate standard volume was 3.4 million units in the U. S. and Canada. Corporation plants could have turned out at least 30 per cent more than that on a straight time basis.

• **Little Change**—These volume relationships probably haven't changed much in the last three years. Industry-wide standard volume has been guesstimated at 5.5 million units for the U. S.

All costs of materials, direct labor, engineering, styling, advertising, and other charges are met at standard volume. Each cost is divided by the standard volume figure to come up with a unit cost. The profit base added to this gives the price to dealers. In the example (right), the dealer's price on a typical low cost standard car, which retails for $2699, would be $1730. Tabbed at $939 would be the dealer markup of 21 to 24 per cent, transportation, excise taxes, make-ready charges, local taxes, and license fees.

Materials	$800
Direct Labor	125
Burden	275
Freight	85
Tooling, Engineering	50
Sales, Advertising	50
Administrative	90
Profit	255

• **Profits Too High?**—That return may look high, but auto buyers are fickle. Every car built over standard volume means an even greater profit since materials and direct labor are really the only costs. Other costs have already been paid. But if you go under standard volume, losses are high. It's the below-standard years like 1958 that the industry guards against.

Right now, automotive management is burning midnight oil figuring what it can afford to give to Mr. Reuther's members over the life of the new contract. Central to the calculations is standard volume and an estimate of how much can be sold over that level.

"We believe we will be the lowest cost steel producers in the Western world" . . .

ROBERT E. S. THOMPSON
Vice president, Webb & Knapp Inc.

Three Steelmakers Prepare for Debuts

ADJACENT to Anaconda Co.'s giant refinery at Anaconda, Mont., is a huge slag pile—the dregs of copper processing over the years. Within the next two years, a modern mill will be extracting iron from the slag and turning it into steel.

In terms of tonnage, the plant next to the slag pile will hardly make a ripple on the U. S. supply scene. But it is significant in this respect: It will mark the startup of a facility that wasn't considered economically practical a few years ago.

Several companies that aren't steelmakers now are investigating techniques which utilize ores and byproduct wastes which have been rejected because their iron content is too low. Three have announced firm plans to go ahead.

The Anaconda plant (Strategic-Udy process) will be operated by Gulf States Land & Industries Inc., a subsidiary of Webb & Knapp Inc. Arkota Steel Co. is building a plant at Coolidge, Ariz., which will use the Madaras method. (It will be in production first, Gulf States second.) The third plant will be erected at Palestine, Tex., by Sovereign Steel Co. of Texas Inc., a subsidiary of Sovereign Resources Inc., New York. It will also use the Strategic-Udy process.

● **First**—Patrick Feeney, president of Arkota, told STEEL that his company's plant will be in operation by Sept. 1. Initial capacity will be 75 tons a day—plans are to double it at an early date.

Arkota is privately owned by seven stockholders. It will be the first company to use the Madaras method commercially. Magnetite ore will be pelletized; then the oxides will be reduced with natural gas. An electric furnace will convert the material into high grade steel.

The company expects to sell its output to fabricators in Arizona. It is also considering the erection of a fabricating plant next to the mill.

Officials say the company has access to 40,000 acres of magnetite ore that contains 500 million tons of recoverable iron.

● **Second**—Webb & Knapp is best known for its large real estate holdings and the fast moving activities of its president, William Zeckendorf. The company has been diversifying into the industrial field for some time.

Gulf States will be one of the first commercial users of the Strategic-Udy process. Plans call for the production of a $37 million facility with a daily capacity of 1000 tons, making it the largest of the new steel producers. Initial production is expected sometime in 1963. Engineering will be completed and equipment will be ordered this fall.

● **Steel from Copper**—Raw material will be of two types. The most important is the slag produced from Anaconda's refining operation—350,000 tons are generated each year; the pile now contains 40 million tons. Gulf States will pay 25 cents a ton for it. The company expects to get 1 ton of steel from each 2.8 tons of slag.

Gulf States will also use a native iron ore (65 per cent iron content) that will be strip mined a few miles away. Webb & Knapp has access to a minimum of 50 million tons of this ore.

Low cost limestone is available 12 miles away. Coal is plentiful

within 200 miles. Electricity will come from the Bonneville Power Administration under terms of a 20 year contract that begins in 1963.

• **Resell Slag**—Adding to the economics of the operation is a plan to recover copper (of 30 per cent or better purity) from the slag, and sell it back to Anaconda. An estimated $3 to $5 worth of copper can be recovered from every ton of steel produced.

The copper recovery process was perfected by Chemetals Inc., which recently became a subsidiary of Gulf States. It's an outgrowth of another process announced by Chemetals last year. (Ores are converted into refined copper without melting by a chemical process. Hydrogen and ammonia are used to recover copper powder.)

Also under consideration is a plan to market the byproduct of the steelmaking operation (called slag-slag) as an additive for cement, concrete, and insulating materials.

Gulf States believes the marriage of the Chemetals process to Strategic-Udy makes such a plant doubly attractive. The point: Both use material heretofore considered unusable. The most costly parts of refining are eliminated. Both allow the operation of an integrated plant at relatively low cost.

• **Markets**—Gulf States says it has one-third of its output contracted for. Major customers will be the dozen scrap remelters in the West and Canada that roll steel into finished products. One customer-to-be fabricates parts for gas transmission lines. Another makes shapes for power transmission towers.

Still to be decided is how much of the output the company will fabricate. A small merchant mill for angles, channels, flats, and rounds is probable. Facilities for making reinforcing rods are possible. Initial production will be all carbon steel. Stainless and other alloy steel facilities may be added later. The plant is being designed so it can easily be expanded to 700,000 tons.

• **Another Plant**—Gulf States may build a second plant at Clarkdale, Ariz., although a timetable has not been set up. The company owns 30 million tons of slag at an abandoned Phelps Dodge Corp., smelter at Clarkedale. Plans call for enriching it with about 10 million tons of native ore. Recovery would run about 1 ton of steel for each 3 tons of raw material.

• **Texas Plant** — Within a few months, Sovereign Steel Co. will begin construction of a 175,000-ton-a-year plant at Palestine, Tex.

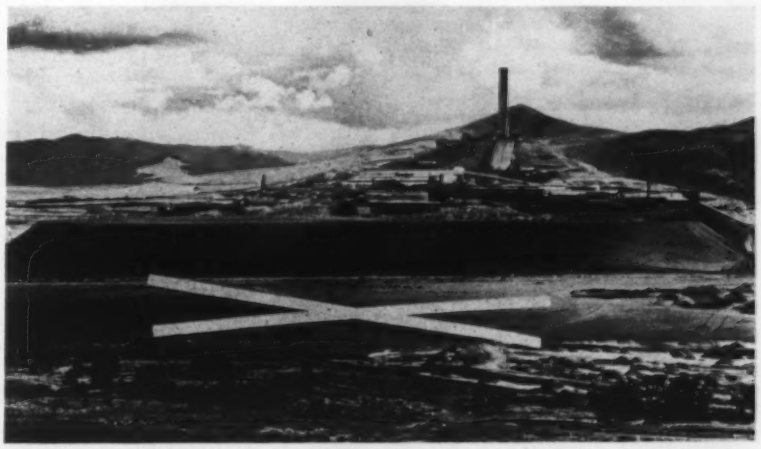
It will be operated under an agreement with the Texas Power & Light Co., which will supply power ($1 million worth a year), iron ore (48 per cent iron content), lignite, and limestone for the operation. It's reported that proved ore reserves will supply the operation for at least 40 years. All reserves may amount to a 300 year supply, says Howard Low, vice president of Sovereign Resources.

Steel will be produced by the Strategic-Udy process in a plant built by Koppers Co. Inc. In a test run, 500 tons of steel were produced from the Texas ore. Results were so encouraging that Sovereign believes its output will be of higher purity than that of most plants. Production costs will be much lower than those of the average steel plant, says Mr. Low. The break-even point is pegged at 100,000 tons a year.

• **First Customer**—A wire products company has contracted to take 84,000 tons a year. Sovereign doesn't plan to do any fabricating, but it is anticipating an expansion of its steelmaking capacity. Facilities for increasing capacity by 50 per cent easily and economically are being designed into the plant layout, says Mr. Low.

Sovereign has not decided whether it will operate the plant or let someone else do it. One major steel company is interested in running the facility under a management contract, reports Mr. Low.

• **More Properties**—Sovereign Resources is banking on more than its Palestine project for full blown entry into the steelmaking field. Through another subsidiary, Arizona Steel Co., the company has a large magnetite property on a 28 sq mi tract halfway between Phoenix and Tuscon. Indicated reserves are about 1.7 million tons of ore (4.4 per cent recoverable iron content) per square mile. The figure is based on a geological survey to a depth of 25 ft. Test drillings have indicated the ore body may extend to a depth of 1200 ft or more. The company is in the process of concentrating and selling this ore.



THE BIG WHITE X marks the site where Webb & Knapp Inc.'s new steel mill will be erected in Anaconda, Mont. The 40 million ton slag pile (beyond the X) accumulated by the Anaconda Co.'s copper refinery will provide the raw material for the mill. The Strategic-Udy process will be used to extract the iron from the slag

Manufacturers Cut Costs by Using

AIRFREIGHT, a relative newcomer among the transportation giants, is changing the concepts of industrial distribution.

Nearly every manufacturer in the U. S. uses airfreight if only for emergency shipments. In 1959, more than 100 companies were using the airlanes as regular distribution channels. Consultants for American Airlines Inc., New York, estimate regular users will increase to more than 500 by 1965.

• **Cost Concept**—Many executives realize that air distribution can be a profitable method of lowering costs and increasing customer service. The air distribution concept is based on the difference between increased transportation costs and the accompanying decrease in other distribution costs. Net result: Often a significant saving.

Raytheon Corp., Lexington, Mass., serves its distributors throughout the U. S. from a single distribution center outside Boston. Direct shipment by air has enabled the company to eliminate three regional warehouses.

The firm estimates it saved $2 million by eliminating duplicated inventories, not counting the savings resulting from closing the warehouses. Furthermore, Raytheon improved its delivery service from an average of seven days to one.

General Electric Co., Schenectady, N. Y., has hired an accounting firm to compute all its distribution costs. By putting all the costs into a computer, the company can determine what percentage of each product should be shipped by air, truck, rail, boat, or barge.

• **Growing Acceptance**—Active promotion of the total distribution concept by the airlines has spurred a tremendous growth in airfreight business. In 1960, U. S. certified airlines (domestic and international) carried 643.7 million ton-miles of freight, reports the Air Transport Association of America, Washington. That's an increase of 42.6 per cent in five years, and 4200 per cent since 1946, the first full year of airfreight operations.

• **Declining Rates**—Rates average 50 per cent or more above those for surface transportation. For about 12 years, they have been subject to a minimum rate floor fixed by the Civil Aeronautics Board (CAB).

Nevertheless, there has been a gradual downtrend over that period—from an average of about 28 cents per ton-mile to 22 cents. Some airlines recently put through new reductions. Flying Tiger Lines Inc., Burbank, Calif., has trimmed rates from the West Coast to Midwestern and Eastern points. The range: 19 to 40 per cent. And Eastern Airlines reports it has revised some commodity rates downward (generally on its south-to-north flights) to encourage shipments.

Most airlines favor the revocation of the minimum rate floor, a move which CAB is reportedly considering. Such action would give the air carriers another big plus.

Check points for savings:

1. **Reduce warehousing costs.**
2. **Eliminate inventory duplication.**
3. **Avoid lost sales.**
4. **Prevent penalties for delays in filling contracts.**
5. **Cut packing, unpacking costs.**

On overseas shipments, you may eliminate or reduce these costs:

1. **Brokerage.**
2. **Storage en route.**
3. **Damage losses.**
4. **Multiple handling.**
5. **Insurance.**
6. **Port charges and duties.**

Airfreight

They already have three on their side—speed, smooth carriage, and integrated world-wide service.

• **Speed**—Allis-Chalmers Mfg. Co., Milwaukee, speeds repair parts to its large electrical power installations via airfreight. The company has found that it is sometimes cheaper than other means—particularly when light shipments are made to areas where minimum shipment rules apply to surface transportation.

A. O. Smith Corp., Milwaukee, finds airfreight is the only way to get auto parts to Detroit on some of its rush orders. The time saved can earn big dividends by preventing the loss of a sale or helping its user avoid a penalty for delay in filling a contract.

• **Packaging** — Air transportation can result in some surprising savings. Boeing Co., Seattle, builds its jet airframes on the West Coast. Practically all its engines are built on the East Coast. The firm used to ship the engines by surface in heavy metal containers which had to be returned.

The engines are now flown to the West Coast. They're packaged in zippered plastic bags and bolted to shipping stands. Boeing estimates it saved $750,000 in shipping costs on the first one hundred 707 jets it produced by air shipping the 400 engines. It was possible to reduce packaging costs enough to justify the higher transportation costs and still save money.

• **World-Wide Network** — Scheduled airlines offer an integrated world-wide service—they have interline arrangements with each other and foreign flag airlines. Service is regularly scheduled to about 5000 points domestically and 160 points in foreign countries.

Door to door delivery is one of the big selling points. The airlines jointly own a corporation called Air Cargo Inc., which has contracts with more than 350 local truckers to pick up and deliver cargoes.

Although freight shipments may move over two or more airlines and then by surface to their final destination, the airlines provide the shipper with one bill. A single, consolidated tariff is provided so the shipper can determine the rate, routing, and conditions of carriage to any point in the U. S.

• **Overseas Freight** — Many companies that resort to airfreight in this country for only rush shipmets, regularly use it for all their overseas freight. International Harvester Co., Chicago, airfreights service parts to virtually all countries of the Free World.

Pan American World Airways Inc., New York, cites one of the biggest reasons for this service: A shipment from Stuttgart, Germany, to Gary, Ind., would take about three weeks by surface transportation. Pan Am's jet clipper cargo makes next day delivery.

Overseas airfreight is also winning customers because of cost cutters like the elimination of forwarding charges, reduced packing and unpacking costs, less damage loss, lower insurance rates, and the elimination of multiple handling. Renault Inc., French automaker, has switched to airfreight. One reason: Air shipment of $203,000 worth of parts to the U. S. costs $52,000 vs. $70,000 by surface transportation.

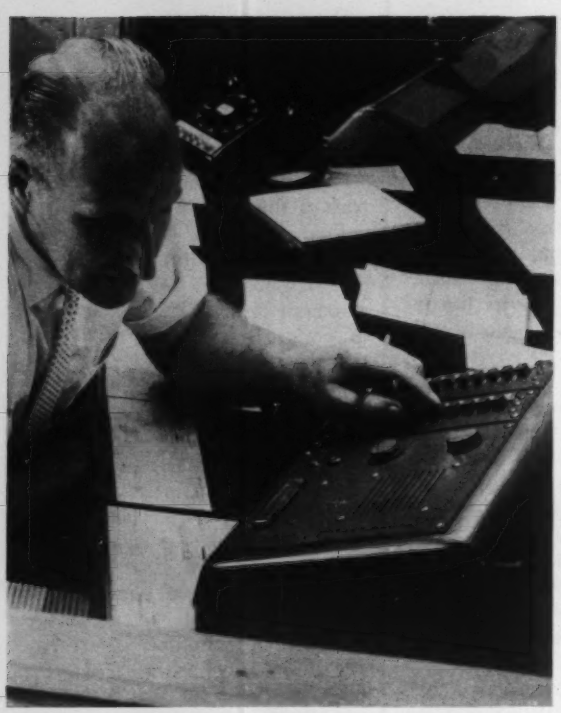
• **Building a Future**—Distribution by air promises to become even more attractive as the airlines continue to modernize their freight terminal facilities and purchase new, cheaper-to-operate airplanes and convert passenger ships to all-cargo carriers.

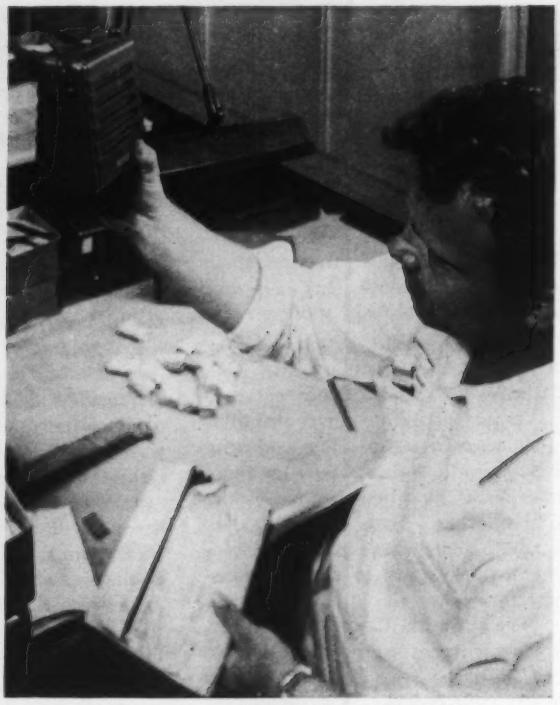
Flying Tiger has its first Canadair CL-44, a long range, commercial craft designed for hauling cargo. It's powered by four, Rolls-Royce, turboprop engines and has a swing-tail for easy cargo loading. The airline will add two more CL-44s to its fleet this summer.

Seaboard World Airlines, New York, an international carrier, also has its first CL-44 and five more are on order.

Other airlines are waiting for pure jet transports for long range cargo hauling. At present, they are converting passenger liners. Eastern Air Lines Inc., New York, has converted five, Constellation 1049-Cs to all-cargo ships. American is converting 15 DC-7 passenger planes.

Airlines are doing extensive work on loading and packaging methods to trim loading time and other operating expenses. Developments include the swing-tail concept, the installation of ball and roller bearings in floors, and preloading on platforms or in metal containers.





Carmet's Production Status Dept. (left) calls plant worker and . . .

Customer Gets Job Data in Seconds

TWENTY to thirty times a day, customers call the Carmet Div. of Allegheny Ludlum Steel Corp. asking for information on the status of their orders or requesting such changes as delivery, specifications, or size. Such service used to consume valuable time and run up costs.

Today, Carmet's Production Status Dept. can give customers the information almost immediately through a communications system that keeps track of as many as 1800 orders as they go through the plant.

• **How It Works**—A supervisor and two clerks make up the Production Status Dept., which is housed in a soundproof office (photo above left). It's the core of a plant-wide communications system. Call-in boxes (see photo on right) are strategically placed throughout the plant. Workers call the office when each phase of work on an order is completed. Each job is number coded. The caller gives the times the job was started and finished, the number of pieces involved, and the process used.

In the Production Status Dept., a clerk records the information on an index card and transfers it to three files—numerical, alphabetical, and according to delivery schedules. The clerk receives more than 600 calls in a normal shift. The call-in procedure takes as little as 15 seconds.

When a customer calls for information on his job to make changes in specifications, delivery date, design, or any other aspect of the order, the exact location and condition of the job can be determined while the customer is still on the phone. And a quick call over the intercom system to the job station can be made to get any other information desired.

• **Seven Big Advantages** — Besides speeding up service on customer calls, the communications system has at least six other advantages, officials of Carmet declare.

1. It helps keep production moving smoothly by alerting the production supervisor to any orders that drop behind schedule. He then can take action to unplug the bottleneck.

2. It saves the production worker's time. He can call Production Status in about one-quarter the time it took him to write reports. A worker

averages about 15 calls a shift.

3. Because workers no longer write the reports, the result is cleaner, more neatly compiled, and more uniform plant records.

4. The system also saves management's time. Formerly, when a customer called, it often meant that someone in management had to take time out to move through the plant until the order was located. Then he had to call back the customer, which also involved more phone charges.

5. Savings also have been effected in raw materials (powdered metal in Carmet's case). With the step-by-step production reports, a damaged part is quickly reported when it moves to a new department. So close control is kept over excess material, and waste is held to a minimum.

6. One of the biggest advantages of the system is that it contributes to exacting cost control. As soon as a job is shipped, all labor costs, production time, and similar information are forwarded from Production Status to the Cost Accounting Dept. Not only is it possible to calculate total costs on the job, but it also provides necessary information so realistic quotations can be given on orders of a similar nature.

Border Steel Rolling Mills Plant Nears Completion

INITIAL OPERATIONS at Border Steel Rolling Mills Inc., Vinton, Tex., are expected to get underway within the next 90 days, reports Edward J. Winter, vice president-general manager.

Construction started last November, and the new facilities will include two electric furnaces with a 60,000 ton annual capacity and an automated Bliss bar and merchant mill with 120,000 tons of capacity. Melt shop operations are expected to begin about Oct. 1.

Principal products will be reinforcing bars, angles, flats, rounds, and squares aimed at the construction market within a 500 mile radius of the mill.

Mr. Winter says the company is also considering the erection of a fabricating shop to produce items for the construction market.

PERCENTAGE CHANGES

First Half, 1961, vs. First Half, 1960

Type of Appliance	Manufacturers' Shipments	Manufacturers' Inventories	Distributors' Inventories
Refrigerators	−9	−14	−14
Freezers	−15	−14	−16
Washers	−10	−25	−20
Clothes Dryers	−13	−11	−10
Washer-Dryers	−36	−44	−12
Electric Ranges (free standing)	−4	−11	−13
Electric Ranges (built in)	−3	−20	−10
Heating Stoves	−6	−12	n.a.
Dishwashers	+5	−29	−8
Waste Disposers	−1	−31	n.a.

n.a.—not available.
Source: Department of Commerce.

Only one plus shows in table for first half on . . .

Appliances: Upturn Ahead?

IMPROVING economic conditions, increased housing starts, reduced appliance inventories, and the introduction of new models add up to greater sales for household appliances in the second half of 1961, says the Department of Commerce.

The high rate of inventory depletion so far this year means that growing demands brought on by improving economic conditions will help speed production lines. Indications were that manufacturers' inventories were 19 per cent less at the end of May than they were at the end of May, 1960. Distributors' stocks were about 15 per cent less.

• **Slow Start**—Despite the bright outlook for the second half, manufacturers' sales for the year are expected to be somewhat less than those in '60 due to a 9 per cent lag in the first six months. The business decline reduced manufacturers' sales of washer-dryers by more than a third. It was also felt strongly in gas ranges, freezers, refrigerators, washers, and clothes dryers. Sales of waste disposers, electric ranges, and vacuum cleaners were off only 1 to 4 per cent from the 1960 period. Sales gains were shown in dishwashers, dehumidifiers, and electric housewares.

• **Exports Drop Too**—The value of U. S. exports of major appliances dropped 3.7 per cent during the first four months of 1961 compared with the year-ago period. Dollar value of January-April 1961 exports was $25.3 million. Among the types hardest hit: Electric ranges, off 40 per cent; clothes dryers, off 29.8 per cent; and freezers, off 22.6 per cent. Exports of vacuum cleaners increased 49.3 per cent, dishwasher exports rose 25 per cent.

McNamara Studies Ways to Streamline Defense Buying

PROJECT 100 at the Defense Department has been set up by Secretary Robert S. McNamara to streamline purchasing for the armed services.

Under the present single managership procurement system, the Army procures all subsistence items, clothing, general supplies, construction, and automotive supplies for all three services—Army, Navy, Air Force. The Navy buys industrial equipment, dental and medical supplies, and petroleum for all. A study is underway to make the Air Force the single manager of common electronic item procurement.

From Project 100, Mr. McNamara hopes to decide on one of three procurement policies:

1. To continue under the present system. 2. To assign all the single managerships to one service. 3. To set up a new defense agency to handle the single managership procurement.

Secretary McNamara's interest in common supply procurement practices goes back to Democratic Party statements during the election campaign that about $8 billion could be saved by streamlining defense activities. A report at the time called for reorganization of the department, but pressures on the administration have been too heavy to carry out the plan.

Project 100 appears to be the first step in a long range program to centralize all defense activities. Or at least that is what the services fear. The secretary has asked each to submit comments on the situation, and is finding little agreement. The Army, proud of its record of saving $400 million through its single managerships, believes it can run the procurement system. The Navy would like to see itself appointed single manager for some, particularly electronic, items. The Air Force wants the electronic assignment. None of the services wants to hand over its procurement to a new agency, which in effect would be a "fourth service."

One possible compromise approach: The creation of a joint supply council to act as a board of directors for the procurement activities of the three services. Such a group would also administer the training of all procurement personnel.

Watch for Secretary McNamara to reach a decision on Project 100 next month.

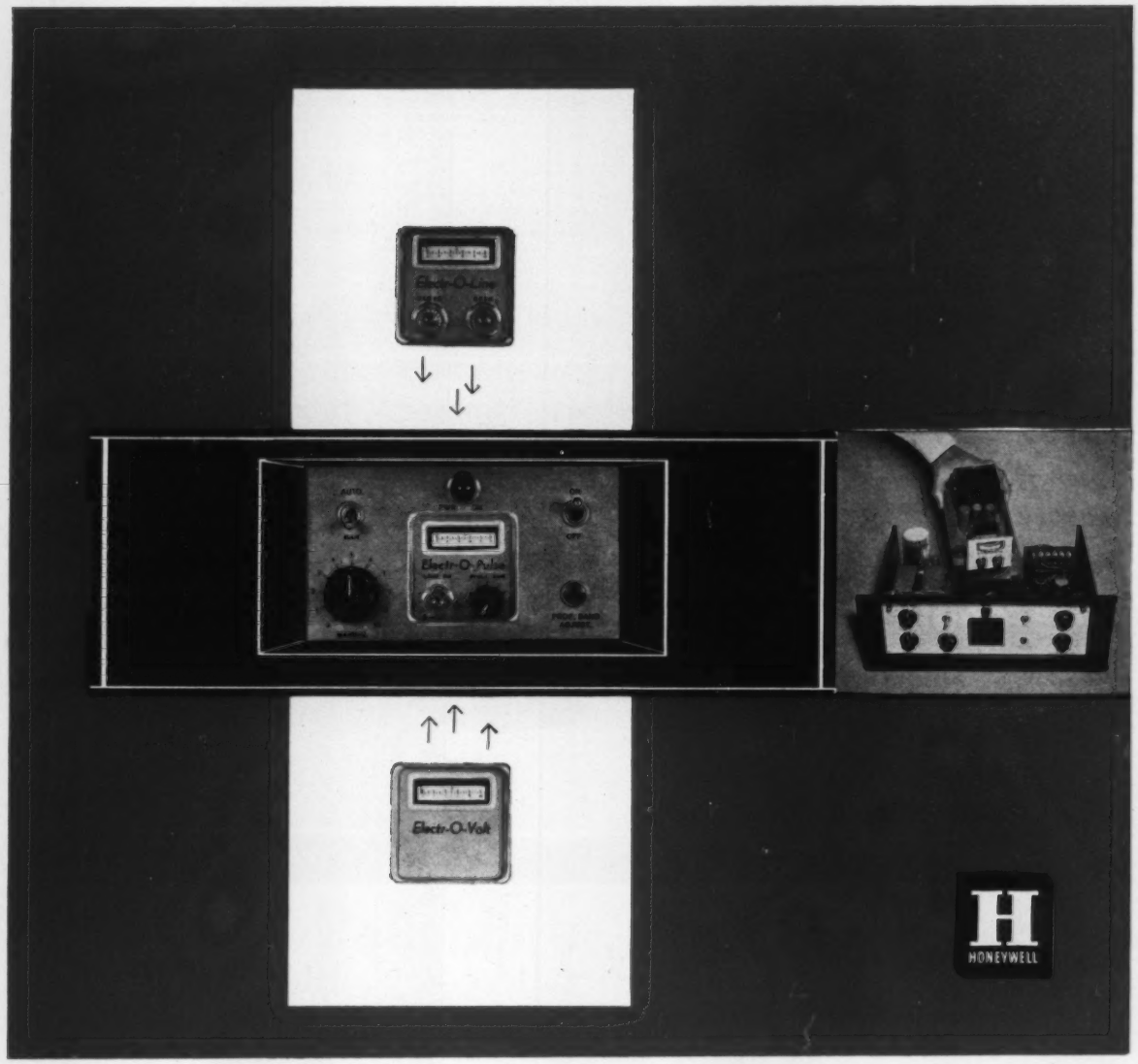
● **DILLON O.K.'s TAX MODIFICATION**—Treasury Secretary Douglas Dillon, reportedly an advocate for increased taxes to pay for the Berlin buildup, has O.K.'d a cut in the 8 per cent tax credit for new equipment investment which has won tentative approval of the House Ways & Means Committee. He has written Chairman Wilbur Mills (D., Ark.):

"I would urge that your final consideration of this legislation provide an approximate balance in over-all revenue effect, preferably through the addition of further revenue raising measures implementing the President's recommendations on closing loopholes, including a possible revision of special tax provisions relating to mutual savings banks and savings and loan associations, *or if need be through a small reduction in the 8 per cent level of the investment credit, or perhaps through some combination of both.*"

The secretary continues to endorse the tax credit: "The investment credit is not recommended as a means of tax reduction for its own sake, but as a much needed incentive and aid to the modernization of our industrial equipment, thereby serving the broad interests of the nation." He asks for quick action because of reports he has received that machine tool orders are being held up while Congress deliberates.

If present schedules hold, Ways & Means will begin final action today (Aug. 14) on the tax bill with the hope of getting it to the floor no later than Aug. 28. Quick passage by the House would be followed by Senate Finance Committee hearings immediately. However, the Berlin crisis and the talk of the need for higher taxes to foot the bill have dampened the enthusiasm of some House members considerably. Outlook: If the tax credit is cut to 5 or 6 per cent, its survival chances are better.

● **AUTO EXHAUST DEVICE DEMANDED**—If the automobile industry doesn't come up with a nationwide voluntary program of supplying all cars with blowby devices for exhausts, look for Congress to pass mandatory legislation with the blessing of Health, Education & Welfare Secretary Abraham A. Ribicoff. Sen. Maurine B. Neuberger (D., Oreg.) says she will introduce such legislation if industry doesn't act.



Three ways to get peak performance from your furnaces!

1. Electr-O-Line Control Unit for position-proportioning control with reset and rate action.
2. Electr-O-Pulse Control Unit for time proportioning control with reset and rate action.
3. Electr-O-Volt Control Unit for current-proportioning control with reset and rate action.

These new Honeywell three-mode control units can actually improve the performance of your furnaces by providing the exact temperature that's needed. They include features that cannot be matched: Smooth three-mode control with extra-wide band adjustments. You can adjust the proportional band up to 500%; reset action from 0 to 100 repeats per minute; and rate time from 0 to 10 minutes. "Auto-man" switching is bumpless.

Modular construction with interchangeable control output sections. Modular plug-in construction is used throughout. Amplifier and power supply sections are the same for all three units.

For more complete details on these and other types of furnace controls, contact your nearby Honeywell field engineer. Minneapolis-Honeywell, Wayne and Windrim Aves., Phila. 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ont.

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Riveting porcelain switches let 1 girl do the work of 6

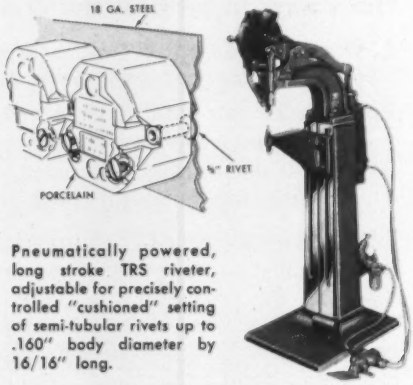
"You don't need to tie up six girls on slow, costly, nut-and-bolt assembly of porcelain switches to this mounting plate. You can do it on an automatic riveter . . . with one girl, low cost rivets, and no switch breakage . . ."

This was the TRS sales engineer's solution to the problem of Liberty Electric Co., Inc., Indianapolis, maker of fine electric table stoves. Trained in the PAR Process approach to problems, he had the rivet and machine know-how to work out the answer . . . an answer that saved five-sixths of the labor.

The PAR Process starts with a search by your TRS man for ways to eliminate or simplify and speed up steps in assembly. It is made effective by specially organized TRS procedures, backed by unique TRS developments in rivets and riveting machines.

FIND OUT what the PAR Process can save you. Ask for a check of your operations . . . it can be worth dollars to you.

THE TRS MAN'S SOLUTION



Pneumatically powered, long stroke TRS riveter, adjustable for precisely controlled "cushioned" setting of semi-tubular rivets up to .160" body diameter by 16/16" long.

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How Complexity Affects Reliability

This table, showing end product reliability in percentages, demonstrates the dramatic decline in end product reliability as the number of components increases and individual part reliabilities are held constant.

Number of Components	Individual Component Reliability			
	99.999%	99.99%	99.9%	99.0%
10	99.997%	99.9%	99.0%	90.44%
100	99.91%	99.1%	90.47%	36.60%
250	99.77%	97.45%	77.85%	8.105%
500	99.64%	95.17%	60.60%	1%
1000	99.08%	90.57%	36.73%	Less than 1%
10,000	91.20%	37.15%	Less than 1%	Less than 1%
100,000	39.81%	Less than 1%	Less than 1%	Less than 1%

Reliability: Profit Cornerstone

THE LATE Tony Bettenhausen, crack racing driver, lost his life reportedly because a little pin was improperly installed in his car's steering mechanism.

Enormously expensive missile failures have resulted from such seemingly insignificant causes as a faulty, 20 cent, transistor.

A major auto manufacturer was forced to reclaim 60 cars from disgruntled customers because nuts cracked on the connecting rods.

All of those costly failures could have been cheaply avoided. Take the case of the carmaker. Its salvation would have been the simple specification of another kind of nut that cost a mere 10 cents per 1000 more than those that cracked.

What Is Reliability?

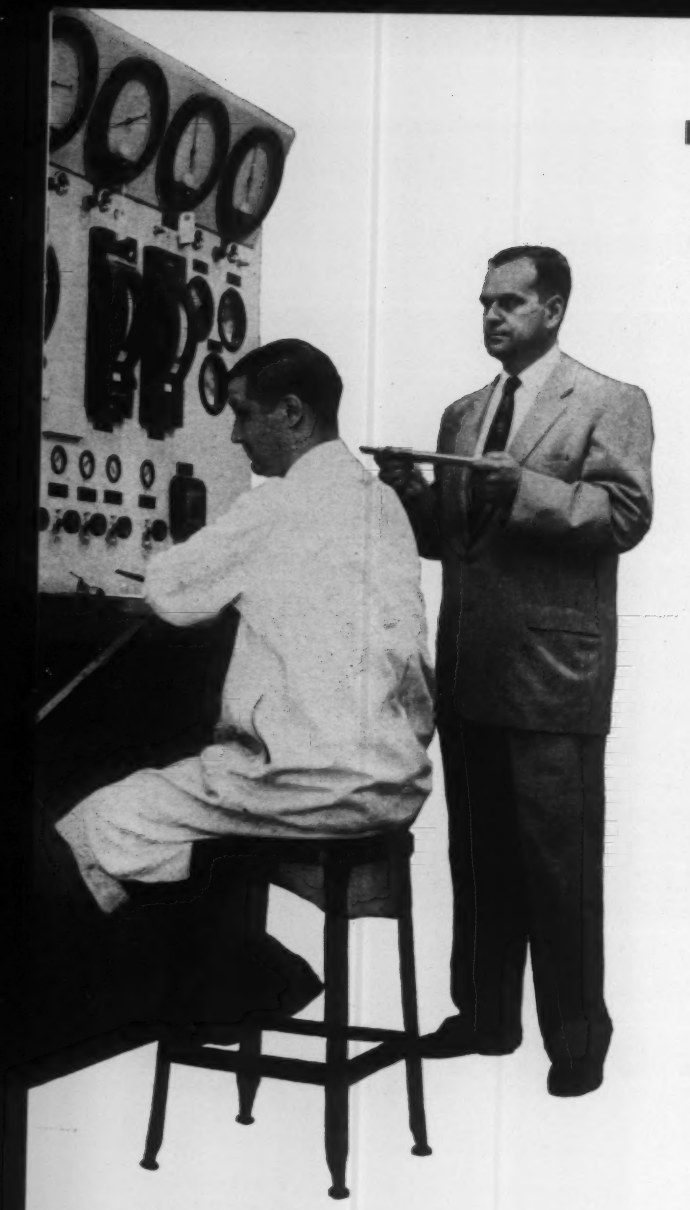
Reliability is the probability that a product will do its job under the conditions to be encountered for the specified time.

Over-all reliability, generally speaking, is the product of all the individual component reliabilities. For example, if your product has only two parts—one with a reliability of 95 per cent; the other, 90 per cent—the over-all reliability would be 85.5 per cent (95 × 90). But if your product has 1000 parts —each with a reliability of 99 per cent—the over-all reliability is less than 1 per cent. Here is a case where the whole is the product, not the sum, of all the parts. It's the "law of probability."

To illustrate, take the six-sided die of a dice game. Your chance of rolling any given side is 1 in 6. The reliability of a "one" then is 16.7 per cent. Try to roll the "one" twice in a row and your chances drop to less than 3 per cent (0.167 × 0.167 = 0.0279).

Product reliability can be handled similarly. Just think of each roll as another component. The chance of a "one" is now the chance of success, or the reliability, of the part. Over-all success of the product demands all "ones."

For example, take a steam turbine containing 1000 blades. If any one would fail, it would likely



Reliability: Profitmaker at Tapco

"There is no question at Tapco that reliability is a profitable venture."
—R. R. Landers (right in photo)
Chief of reliability, Tapco Div., Thompson Ramo Wooldridge Inc.

The profit contribution shows up in many forms:

- **Standards**—A bolt, washer, and nut assembly costing $10, used in quantities of 50 per finished product, was checked by the "reliability standards group." It found a replacement for only 10 cents that served the same function. Savings: $495 per unit. "Of course, there aren't many of those 100-to-1 nuggets lying around," says Mr. Landers, "but, by digging hard and applying the principles of value analysis and standardization, the reliability group can consistently reduce costs of current equipment by one-third."

- **Design Research**—Mr. Landers points out that the most effective area for profit contribution is the reliability group's work with the designer. Designs are reviewed and audited during the inital stages of a development program. Says Mr. Landers: If there was a design shortcoming that would cost $1 to correct prior to the inital drafting release, it would cost $10 after the final release, $100 at the prototype stage, $1000 at the preproduction stage, and $10,000 at the production stage.

- **Vender Work**—Tapco gives values and statistical confidence levels, plus testing procedures to venders. In that way, it quantitatively defines areas of work that previously were vague or omitted entirely. Mr. Landers says this not only improves the product, but it improves supplier relations as well.

- **Maintenance**—Tapco applies reliability tools and techniques in maintenance. The firm found that the majority of its repair costs varied from $1500 to $8000. By applying reliability principles to its preventive maintenance program, it has increased mean time between failures, and attained longer equipment life.

ruin the turbine. A reliability for each blade of 99 per cent would mean that every turbine would probably blow up.

It's a Cost Cutter

If the manufacturer were always faced with the choice between designing costs out of his products or designing reliability into them, high failure rates would be understandable—though not excusable.

But many times that choice need not be made. Manufacturers with reputations for reliability, contacted by STEEL, unanimously assert that the dollar spent for reliability is a dollar invested in profit growth.

Listen to N. H. Holt, reliability manager for Minneapolis-Honeywell Regulator Co.'s Aeronautical Div.: In many companies, "the feeling is that reliability has become a necessary expense. Completely overlooked is the fact that reliability can and must pay its own way." He suggests that reliability is somewhat like research. "Research is expensive but without it we find our products obsoleted by competitors. Reliability is a major factor in assuring continued acceptance of a product and therefore is instrumental in determining future profits and growth."

In a specific case, Mr. Holt points to the use of a detailed parameter variation study, plus rigorous failure analysis and corrective action, that slashed scrap and rework losses by 50 per cent in six months. Losses fell from 8.5 per cent of standard factory costs to 4 per cent.

Frigidaire Div., General Motors Corp., reports that its 1961 appliances are requiring 9 per cent less service than the 1960 models and 33 per cent less than 1957 models.

And a camera maker has stated publicly that it will not be panicked into bringing out a new product too soon just to meet competition, thus eliminating one of the most irritating causes of poor reliability.

Reliability Demands Soar

Today's torrid technological tempo—higher speeds, higher tem-

peratures, higher stresses—makes mistakes more and more costly. Standard Pressed Steel Co., Jenkintown, Pa., offers this example: Not long ago, in the cosmic scale of things, we could send out 10,000 men with bows and arrows to defend us. Now we must send up an antimissile missile. And if it heads south instead of north . . .

At the same time that mistakes —military or industrial — are becoming more costly, they are becoming more likely. That's the natural result of increasing design complexity, a growing number of parts, miniaturization, the need for higher productivity, and other factors.

Net result: Reliability becomes imperative for industrial existence.

How do you get higher reliability?

It begins with a management philosophy and clear goals.

Management Fosters It

The late Julian Sprague, chairman of the Defense Department's Advisory Group on Electronic Parts, asserted five years ago: "The first essential ingredients to the achievement of reliability are a basic understanding of the problem and a management philosophy which will dictate the all-out kind of company effort that is necessary."

Says his brother, Robert C. Sprague, chairman, Sprague Electric Co., North Adams, Mass.: "If Julian were with us today, I think he would add that we have come a long way toward the basic understanding of the problem, but we still have a long way to go in developing the necessary management philosophy . . ."

A vital part of management's reliability responsibility is the establishment of qualitative goals. Maytag Co., Newton, Iowa, has done that. Says Fred Maytag, chairman: "It is our stated goal to deliver to the dealer a product which he can install in the customer's home with confidence that it will require no major repair for ten years."

Studebaker-Packard Corp., South Bend, Ind., offers another example of the reliability philosophy—an extension of the Studebaker brothers' original motto, "Give more than you promise." That goal can be translated in many ways at many organizational levels.

Here's one example:

E. J. Lievens, stamping plant manager, switched to a steel that boosted material costs by $17,929 annually. But he trimmed the total cost of the finished part by $42,055 yearly due to the better steel's improved drawability.

Design Establishes It

"Efforts to keep reliability values from deteriorating during manufacture and use are important, but the greatest return on investment is in assuring a high initial level of re-

How to Upgrade Human Reliability

"Product failures are the direct result of people failures. There is nothing wrong with the electrons, atoms, and molecules—it's our fault in how we use them, or in many cases, misuse them."

H. T. Hallowell Jr.
President, Standard Pressed Steel Co.

"The definitions of quality, control, reliability, and waste total more than 26 in. long in **Webster's New International Dicitionary**—at 13 lines to the inch. Throughout, we find such words as virtue, trust, dependability, honesty—what I find most interesting is that all these apply to human beings. So to control quality, we must influence the actions of the people doing the productive work. It is necessary, therefore, that we have a dynamic setup which is sufficiently current that the people working, and their supervisors, know, while the work is being performed, how their efforts compare with the quality standards. By the time any figure becomes typewritten, and then a statistic on somebody's desk, it's too late to take effective action on the current problem."

That's how Mr. Hallowell spells out the reliability problem. To solve it, SPS has established a "constant quality audit." It covers the blueprint, specifications, materials, methods (and practices), tools, machines, gages, handling, and the people at each operation, plus their supervisors and management. Says Mr. Hallowell: "We use the techniques of a baseball umpire—a small staff of objective people examine production at each operation, compare the work with the exact dimensions on the print and the specifications. Any deviation, however minor, is recorded in three ways: 1. First to the operator. 2. Then to his supervisor. 3. Last on the department statistic sheets."

In making the audit, jobs in each department are selected at random—usually not more than 20 per cent each day. The unknown factor—when and where the audit will fall—keeps everyone on his toes.

The audit system pays off. From 1959 through mid-1961 customer returns have been more than halved; scrap and repair costs were reduced 40 per cent.

liability during the design effort," points out R. R. Landers, chief of reliability, Tapco Div., Thompson Ramo Wooldridge Inc. (see Page 94).

Among reliability methods and procedures widely used: Design reviews, component and design standards, failure analyses, value analysis, maintainability analysis, logistics engineering support, reliability assurance testing, monitoring, motivation and educational programs, consultation services, information interchange, statistical techniques.

But before the tools and methods can be effectively applied, the designer must recognize, and adhere to, some basic principles. Among them:

1. Keep in mind that the product must withstand actual, not expected, service conditions for a given length of time.

2. The product must withstand, not just operating conditions, but all environments to be encountered. Example: Shock and humidity during shipping.

3. Consider the life behavior of all components and materials—they may fail through gradual change of characteristics or decline of properties.

4. Standardize where practical.

5. Remember that there is no such thing as an insignificant part.

6. Beware—a single test proves nothing. Design is a developmental process in which testing is a feedback device to guide redesign.

7. The designer's job doesn't end when the production line starts rolling—continued improvement should be the goal. At Maytag, for example, 442 specification changes were made in the three years after its Model 142 automatic washer was first produced.

8. Never be rushed into a slipshod design effort because "we've got to beat competition to the market place."

Lippincott & Margulies Inc., New York industrial design firm, points up this last problem: "There exists among manufacturers a strange sort of monkey-see monkey-do compulsion which leads to a vicious circle of copy-catting. Let one leading manufacturer come out with a refrigerator with squared-off corners and, before you can say 'two-seventy-nine-ninety-five,' every other maker squares off his corners too. This is designing for the competition—not for the product, nor for the product's buyers."

It's an Investment

Dollars spent for reliability are investments in reputation, in prevention, and, over the long pull, in profit growth. Make no mistake—a reliability program costs money to establish. But it should be considered in the same light as R&D or market research or plant modernization.

"The investment pays off handsomely," says John L. Burns, president, Radio Corp. of America. He knows from experience—his firm spent more than $2 million on special quality controls in 1960 for its home instrument lines alone. Says Mr. Burns: "Through the most rigid series of tests ever devised, we are closing the escape valves before defective instruments can get to the shipping platform."

Every RCA division must walk the chalk line of reliability. At the Semiconductor & Materials Div., Somerville, N. J., for example, the failure of 25 transistors to pass reliability tests will cause an entire lot of 100,000 to be thrown out. To guard against such catastrophes, the division has invested $2.2 million in equipment to assure that standards are maintained.

Don't Overdo It

Dollars spent for reliability should pass the same test as any other business investment: Will the return justify the expenditure?

It is possible, as some manufacturers have found to their chagrin, to overestimate demands for reliability.

Example: In 1954, Sprague Electric Co. began the development of a line of subminiature, metal cased, capacitors with a reliability 1000 times that of the conventional product. The project was successfully completed in 1958, at a cost exceeding $1.5 million plus the time of some of the firm's best people. Manufacturing costs were such that the unit price had to be established at double the conventional price. But Sprague officials reasoned that twice the price for 1000 times the reliability was still a good buy and that a large market awaited them.

Three weeks ago, President R. C. Sprague told STEEL: "It appears that we'll not recover the development cost from direct sales . . . but we have benefited in that increased knowledge and improved process controls have been incorporated into other product lines . . . "

Inspection Verifies It

You can't inspect reliability into a product, but testing and inspection provide the data whereby reliability can be designed into it. As SPS puts it: "Testing is the cornerstone of predictability."

So many firms are upgrading this end of their business. At Honeywell, for example, inspection begins three to nine months before production. Inspectors study engineering specifications, instrumentation, costs. They lay out a plan for testing and inspection, design any necessary equipment. The firm also sets quality goals and compares performance against them. Inspectors are placed in every area handling design, production, or model work.

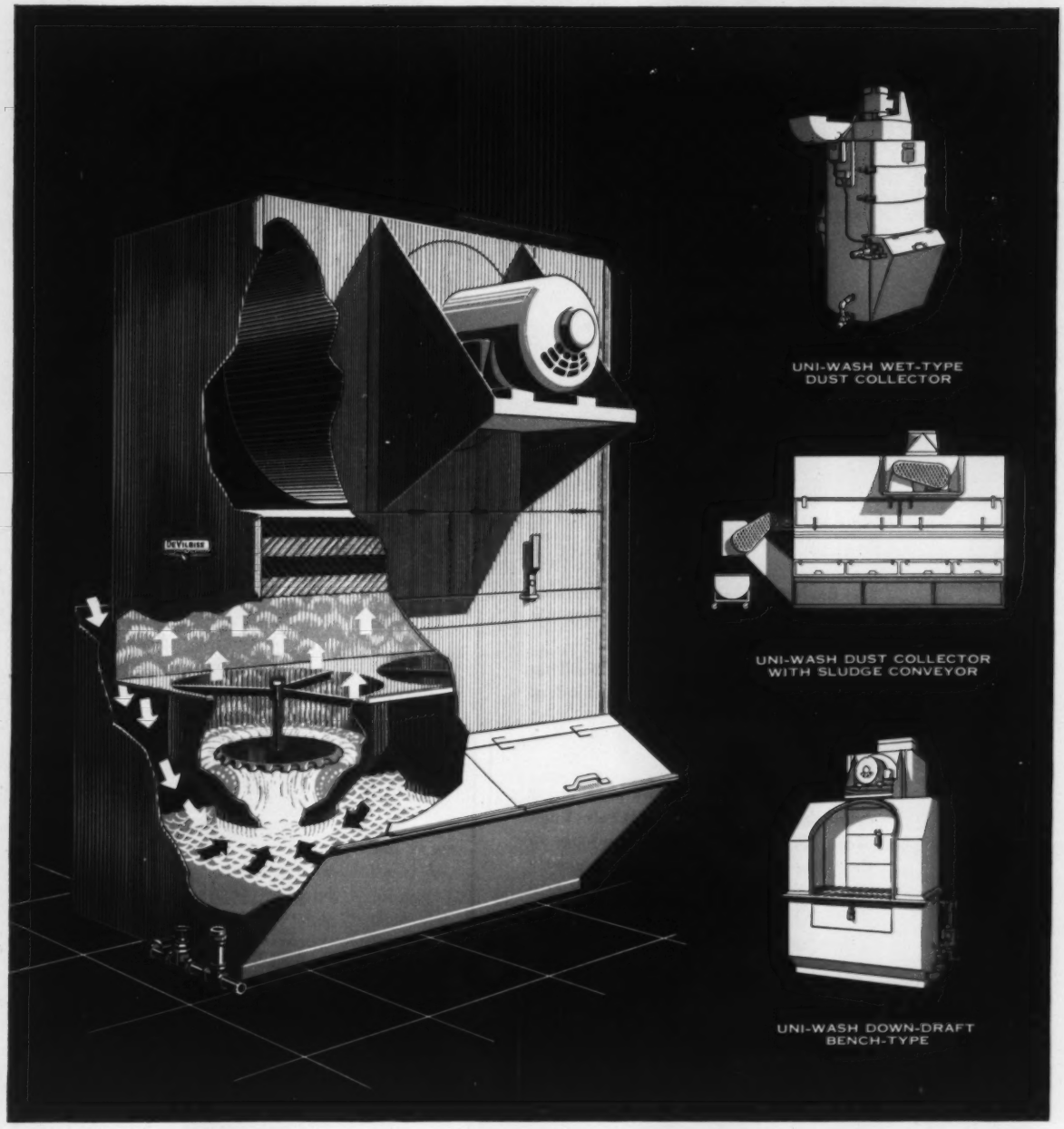
Reliability Challenge

The challenge is hurled by Lippincott & Margulies: "Barnum may have been right when he suggested that a sucker is born every minute, but it's equally true, as Anonymous pointed out long before Barnum, that 'once bitten is twice shy.' The quickest way to a short product life span is to underestimate the common sense of the consumer."

PLAN FOR PROFIT GROWTH

Inform for Profit Growth

On Aug. 28, STEEL will suggest how to keep abreast of the knowledge about our technology which is developing so rapidly that we have trouble keeping pace with the changes. For a free copy of any or all articles in this series (appearing biweekly since Jan. 16), write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



dust collectors from DeVilbiss are your answer if you have a problem involving process dust. This Uni-Wash wet-type unit washes, scrubs, and fogs contaminants from the air stream during processing. Other types remove vapors, corrosive fumes, chips, dirt, sticky mists. DeVilbiss can build complete systems to your specifications—or furnish standard units ready for bolting to your floor.

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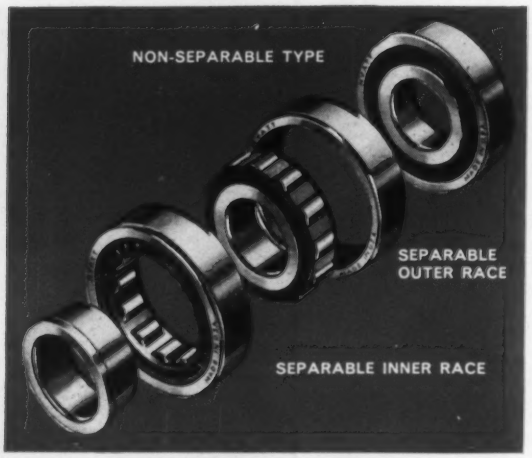

SERVICE

The fundamental difference in the service you get from one supplier or another can usually be traced to people.

HYATT has been fortunate to build an organization which contains the kind of people who make this difference apparent in the way that they make, sell and service Hyatt Bearings.

No one, for example, knows more about cylindrical bearings than Hyatt Sales Engineers. The experience and knowledge of these trained bearing specialists regularly save vital man-hours and dollars for customers in almost every kind of industry.

You will appreciate their painstaking study of your individual problems of how best to apply a bearing. You will appreciate their conscientious study prior to every bearing recommendation they make. These factors are a dollar-saving "plus" for you when you need to replace or install new bearings.

Some call it service. Hyatt calls it people. You are urged to discover the difference in Hyatt people when you have a bearing problem. It's yours for the asking.

2

RELIABILITY. Hyatt's Reliability Program embraces every phase of product development . . . and that starts with nothing less than the highest-grade raw materials.

3

PRICE. Hyatt's advantages of quality, assembly practice and uniformity of product can often reduce over-all cost to you.

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DELIVERY. Hyatt's unsurpassed production facilities deliver bearings in quantity with maximum speed and economy.

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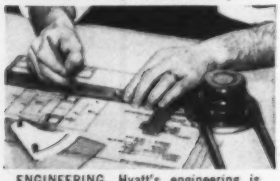

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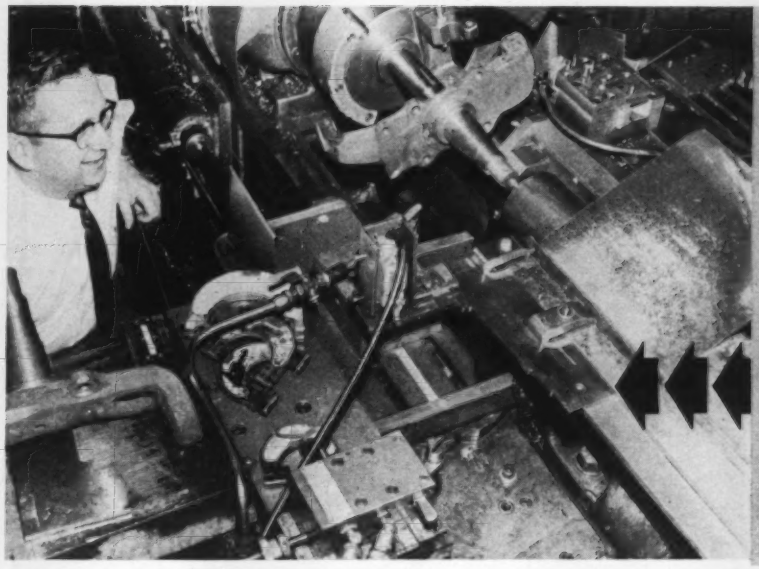

Tracer Advantages

- Lowers tooling costs.
- Reduces tool inventories.
- Speeds changeovers.
- Upgrades old machines.

Tracer Control Pays Off for GMC Truck

WHEN PRODUCTION parts are so low in volume that multiple or special tooling is uneconomical and when the parts are so simple that numerical control isn't needed, tracer lathes are the most efficient production method, asserts Ted Gibson, process engineering supervisor, GMC Truck & Coach Div., Pontiac, Mich., General Motors Corp.

Unlike its sister car divisions which depend on special tooling for high volume production, GMC Truck finds many of its part production runs are in quantities ranging from 50 to 200 pieces. Result: It's a strong advocate of tracer lathes. It has seven in operation and plans to install more.

Compared with numerical controls, Mr. Gibson finds that tolerances are equally good. He says the slower production rates are balanced by lower tooling costs. Another advantage: The use of tracers does not require specially trained maintenance men.

Against multiple tooling, Mr. Gibson points out that tracer costs are lower because inexpensive universal tooling can be used. Changeover times are shorter and perishable tool inventories can be pared in half. Several tracer machines can be operated together.

In addition, tracer mechanisms can be easily adapted to old machines to give them new machine tolerances. "Since tooling changeover requires only a simple tracer template (usually costing less than $100), several similar jobs can be run on the same equipment," adds Mr. Gibson.

• **Typical Example**—Use of tracers has enabled GMC Truck to produce a newly designed steering knuckle for its DLR-8000 series tractor for one-fifth of what it would have cost with multiple tooling or numerical controls. The series went into production last year.

Production calls for only 200 parts a month which didn't justify setting up for high production machining operations. The division had several other types of knuckles which it hoped to run on the same equipment. It started an evaluation study to see what would be the most economical production method. High capital equipment costs ruled out numerical control from the beginning.

The knuckle is an SAE 8640 steel forging with a Brinell hardness of 255-302. Design is simple although there's one complicated machining job in turning the stem and facing the brake mounting flange. GMC Truck had only two production lathes with enough outside diameter swing to handle the machining job.

"We considered running the job on a multiple machine process, but we would have needed 11 cutting tools on the rough pass and 11 more on the finish pass. We also would have had to build special tool blocks on the front slide for roughing and finishing. We would have had to buy special taper turning attachments for those operations too," re-

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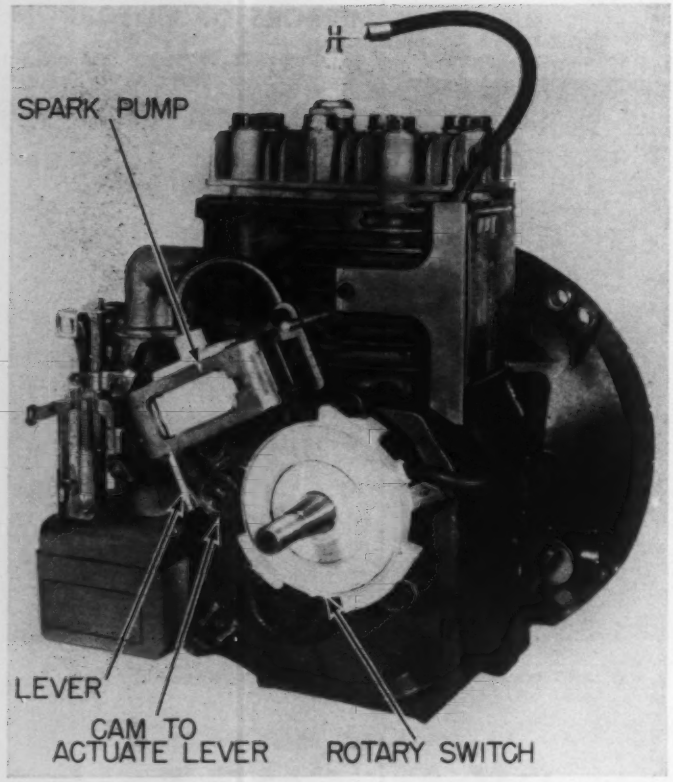


Clinton Adopts PZT Spark Pump

AN IGNITION system based on the piezoelectricity (PZT) theory can provide more reliable, better timed ignition by replacing the magneto on small engines with a spark pump (containing PZT ceramic crystals) that produces a higher voltage.

Developed by Cleveland Graphite Bronze Div., Clevite Corp., Cleveland, the new system is being used by Clinton Engines Corp., Clinton, Mich. Clinton developed a new 3.5 hp engine, built around the PZT system, for lawn mowers, farm equipment, generators, pumps, and similar applications.

Predicts Harry J. Graham, Clinton vice president: "The small engine has been waiting a long time for a breakthrough like this. I think that within ten years we'll see the system used on all small engines and most multicylinder engines—including those for autos and trucks."

ports Mr. Gibson.

Another problem: With the lathes available for multiple tooling, it would have been impossible to hold 100 microinch tolerances on the oil seal diameter. Nor could the division maintain 5.251/5.248 in. tolerances on the pilot for the backing plate. That would have called for another machine, two additional operations, and special tooling.

• **Pick Tracer**—GMC Truck decided to adapt the two production lathes it had to hydraulic tracer controls made by Detroit Broach & Machine Co., Rochester, Mich. "This tracer permits us to hold absolutely square facing areas during machining," reports Mr. Gibson.

Tooling up the job called for single tool blocks on the front and rear slides of the first (roughing) machine. The second lathe needed one tool block on the rear slide, two tracer templates, and three standard carbide turning tools.

The first machine hogs out excess stock on the brake facing flange in one operation on the rear slide. The entire stem and oil seal are rough turned on the tracer controlled front slide. On the finisher, the tracer path starts at the stem and follows the entire surface in a single, continuous cut. Normal surface speeds of 250 fpm and feeds of 0.015 ipm are used. Tolerances are held to ±0.001 in. Production rate is about 15 pieces an hour. Only the tracer templates are changed to switch from one type of knuckle to another.

Reports Mr. Gibson: "The tracer lathes do the entire machining job in two passes and use only a quarter of the tooling multiple machining would have required. We also find that we no longer have to grind locating surfaces on the spindle part of the knuckle because the tracer will hold the bearing diameter close enough for locating purposes (±0.001 in.)."

U. S. Auto Output

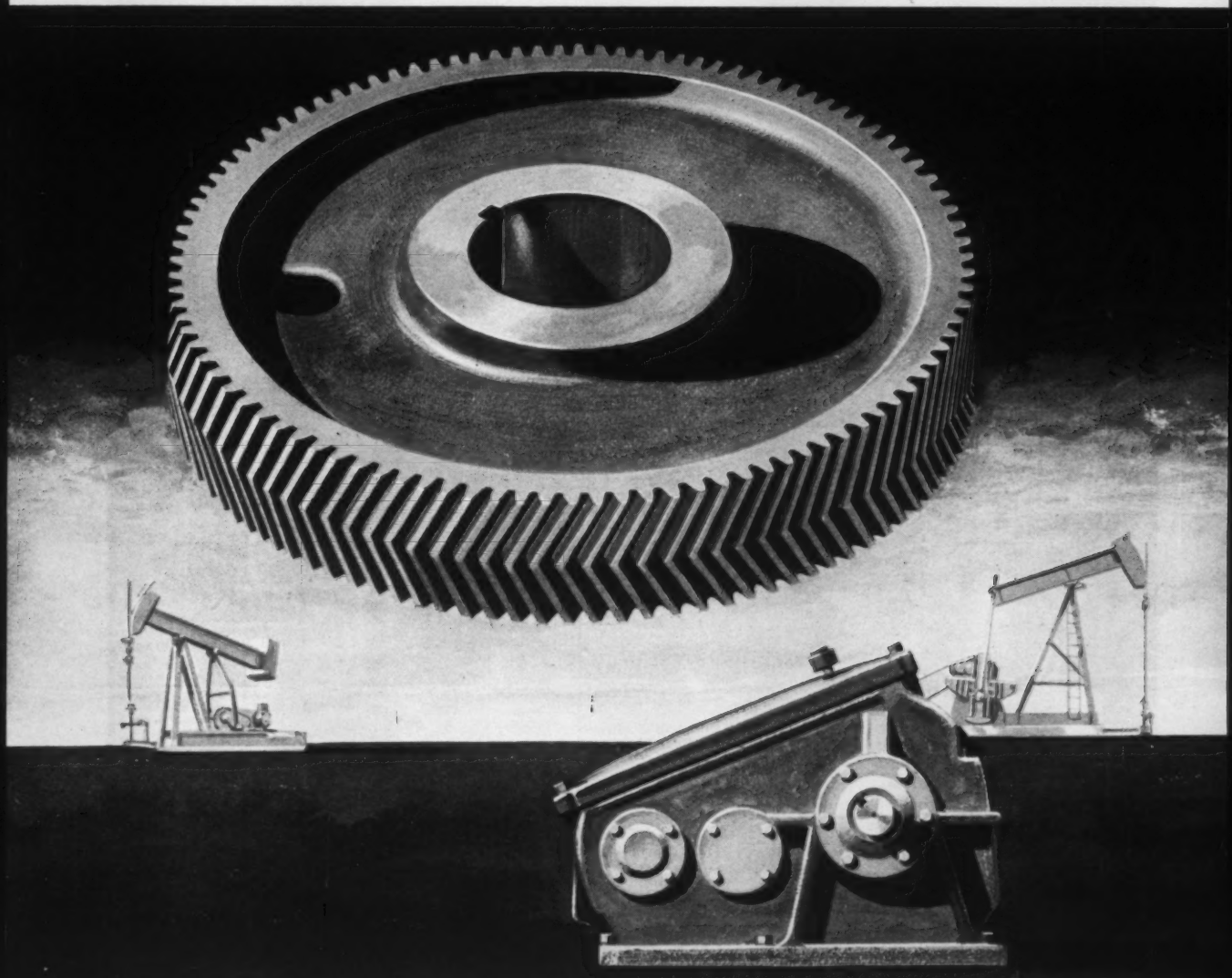
Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
June	559,474	613,136
July	399,157	434,377
7 Mo. Totals	3,135,874	4,243,871
August	.....	305,514
September	.....	407,691
October	.....	617,972
November	.....	597,638
December	.....	523,422
Total	.....	6,696,108

Week Ended	1961	1960
July 8	85,889	89,769
July 15	127,157	105,113
July 22	102,875	112,179
July 29	74,831	107,019
Aug. 5	32,020†	103,504
Aug. 12	18,000*	84,139

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

How the Foundry Industry Serves America . . . #16 of a Series



IRON CASTING REPLACES STEEL FORGING, SPEEDS PRODUCTION, CUTS COST 44%

Installed in speed reducers on oil field pumps, this high speed gear has to be strong enough to stand up under load reversal shocks every 180 degrees of gear rotation. Originally, it was produced from a steel forging and cost $77.61 to make. Now, as an iron casting, it's turned out for just $43.39!

Material cost dropped from $36.00 to $21.70 and machining time was cut from 251 to 60 minutes per gear. Estimated annual savings resulting from the change on a complete line of speed reducers—$28,300! What's more, product efficiency improved—because cast iron has its own built-in lubricant to reduce wear on gear teeth.

This is an excellent example of how modern iron castings can solve problems of industrial design and effect substantial manufacturing savings.

For the production of structurally sound iron castings, Hanna Furnace provides foundries with all regular grades of pig iron . . . foundry, malleable, Bessemer, intermediate low phosphorus, as well as Hanna Silvery.

Facts from files of Gray Iron Founders' Society, Inc.

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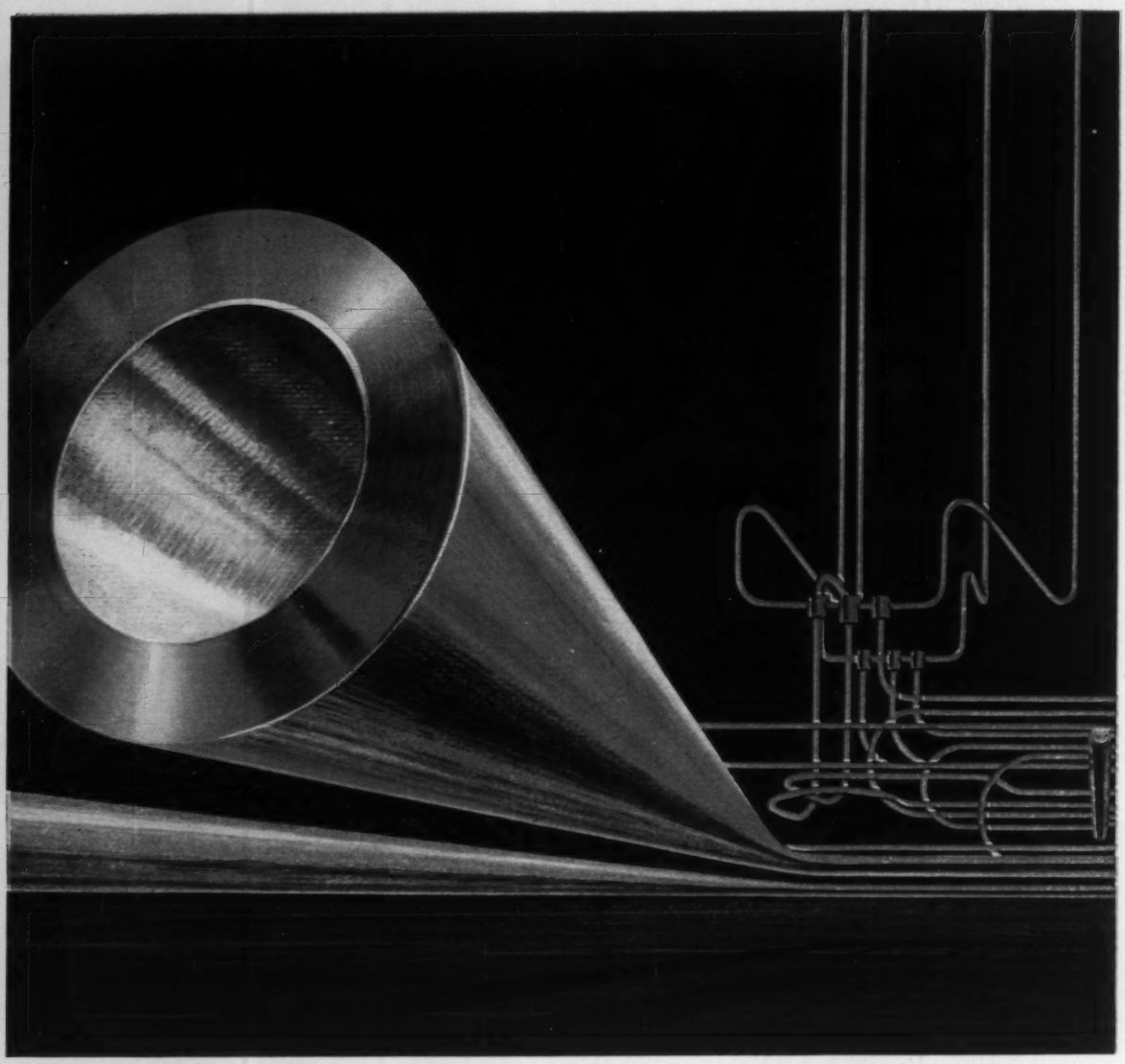

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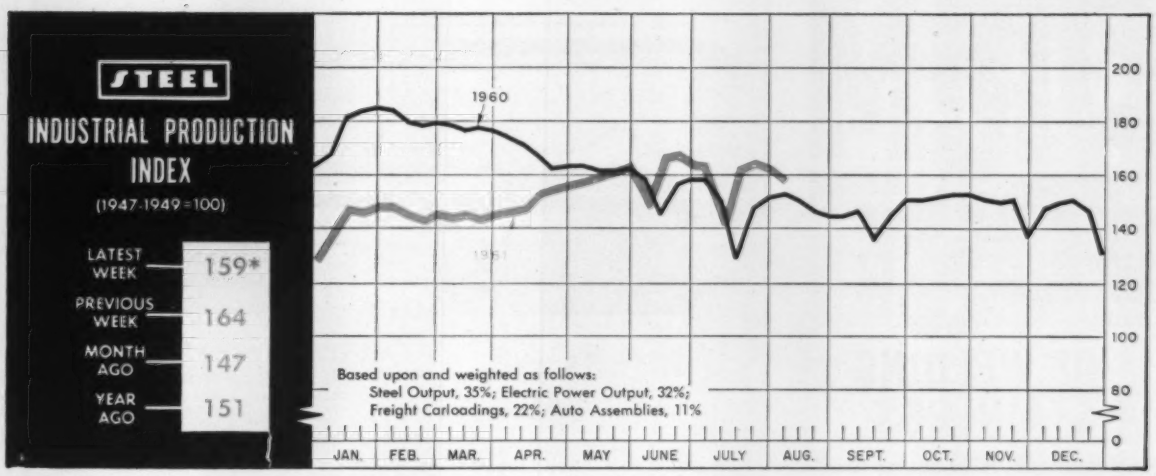

*Week ended Aug. 5.

Auto Cutbacks Hide Over-all Trend

DON'T let that dip in STEEL's industrial production index (above) fool you. If you'll look at last year's trend line, you'll see that the same sort of thing happened about one month later. Reason: The automotive shutdown for new model changeover.

Take the automotive segment out of the index and things look pretty good for a midsummer week. Instead of a 5 point decline during the week ended Aug. 5, there would be a rise of over 1 point. On the basis of electricity output, steel production, and railroad freight carloadings, here is how the index shapes up since the July 4 holiday week (1947-49 = 100):

July 15	146.9
July 22	152.6
July 29	153.4
Aug. 5	154.7

● **Summer Heat Helps**—The main factor behind the strength in the index is the output of electricity. All-time records were established in the last two weeks of July, and at least one more is expected in August. There is no question that the big influence here is hot, humid weather—air conditioners are big users of power—but gains have been widespread throughout residential, commercial, and industrial users. And the biggest gains have not been registered in the South, as might be expected, but in the Mid-Atlantic and Rocky Mountain areas. The important Central Industrial region has been consistently posting 5 per cent gains over the year-ago period, reports Edison Electric Institute.

Further upward pressure is coming from the railroads, which have shown a gradual rise every week since the July 4 holiday period. Much of it has been in the agricultural products, but miscellaneous loadings (largely metalworking products) and iron ore have shared in the rise.

Finally, steel production, while not adding to the index, has been

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	1,890[1]	1,850	1,525
Electric Power Distributed (million kw-hr)	16,150[1]	16,107	15,125
Bituminous Coal Output (1000 tons)	8,140[1]	7,785	8,266
Crude Oil Production (daily avg—1000 bbl)	6,950[1]	6,945	6,837
Construction Volume (*ENR*—millions)	$458.1	$399.7	$561.7
Auto, Truck Output—U. S., Canada (*Ward's*)	45,286[1]	99,521	118,380
TRADE			
Freight Carloadings (1000 cars)	600[1]	591	594
Intercity Truck Tonnage (changes from year ago)	−0.2%	+0.8%	−2.4%
Business Failures (Dun & Bradstreet)	319	343	293
Currency in Circulation (millions)[2]	$32,449	$32,476	$32,044
Dept. Store Sales (changes from year ago)[2]	+2%	+2%	+1%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$25,794	$28,458	$27,102
Federal Gross Debt (billions)	$292.4	$289.7	$288.3
Bond Volume, NYSE (millions)	$33.0	$36.1	$24.0
Stocks Sales, NYSE (thousands of shares)	18 833	17,360	12,844
Loans & Investments (billions, adjusted)[3]	$115 0	$112.9	$104.7
U. S. Govt. Obligations Held (billions)[3]	$34.1	$31.9	$27.3
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	225.1	225.1	231.1
All Commodities[6]	118.6[1]	118.6	119.5
Commodities Other than Farm & Foods[6]	127.5[1]	127.5	128.3

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

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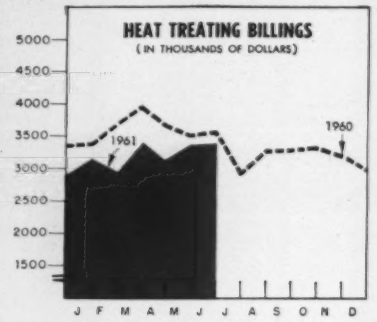
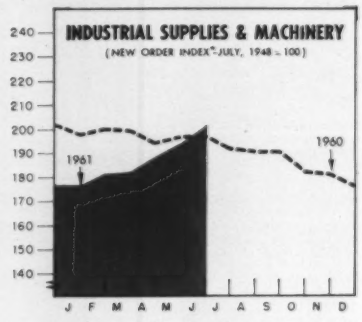
THE BUSINESS TREND



	1961	1960	1959
Jan.	3,171.6	3,381.6	2,769.1
Feb.	2,942.3	3,698.8	2,828.0
Mar.	3,393.3	3,921.9	3,273.8
Apr.	3,140.9	3,642.6	3,316.1
May	3,370.4	3,594.3	3,302.8
June	3,386.8	3,546.7	3,512.2
July	.....	2,899.7	3,302.1
Aug.	.....	3,266.0	3,162.8
Sept.	.....	3,281.7	3,263.8
Oct.	.....	3,306.8	3,531.2
Nov.	.....	3,165.5	3,092.2
Dec.	.....	2,925.2	3,357.2

Metal Treating Institute.



	1961	1960	1959	1958
Jan.	176	198	186	163
Feb.	181	200	202	157
Mar.	182	199	221	149
Apr.	188	194	218	148
May	194	196	218	152
June	201	197	212	164
July	...	191	216	170
Aug.	...	190	212	172
Sept.	...	190	207	178
Oct.	...	182	204	187
Nov.	...	181	202	189
Dec.	...	176	202	190

*Seasonally adjusted.
Amer. Supply & Machinery Mfrs.' Assn.

Charts copyright, 1961, STEEL.

a stabilizing factor since early July.

• **Outlook**—It will be at least one more week before the index picks up. If hot weather holds, electricity should remain well above the 16 billion kw-hr level throughout August. Freight carloadings will remain firm, possibly gaining as August crops go to market and 1962 model cars fill the pipelines. All predictions for steel production point to a month at least as good as July, probably better.

But the big factor this month—and next—will be automobiles. STEEL estimates that production in the week ended Aug. 12 was no more than 18,000 units—the lowest nonstrike weekly figure in the memory of veteran industry observers . (All of that will be accounted for by '61 models at Ford Motor Co., with the possible exception of a few '62 pilot models at Studebaker-Packard Corp.) Just as Ford completes its 1961 model run, most of the other producers will begin the '62 lines. Slated to start this week are Pontiac, Oldsmobile, Buick, Cadillac, Rambler, and all Chrysler Corp. divisions. Output probably won't be much more than that of last week, but by Aug. 21, a significant rise should boost STEEL's industrial production index several points.

• **Steady Rise**—The trend then will continue through the last four months of 1961, probably reaching the all-time high (185 set in January, 1960) in late October or early November.

Statistics Looking Better

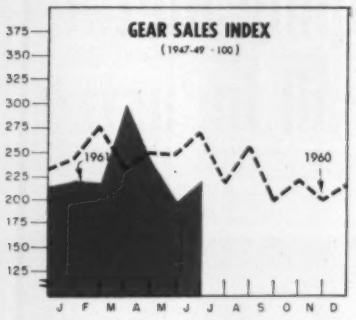
Reports coming from metalworking industries indicate they are beginning to feel the recovery a little more strongly.

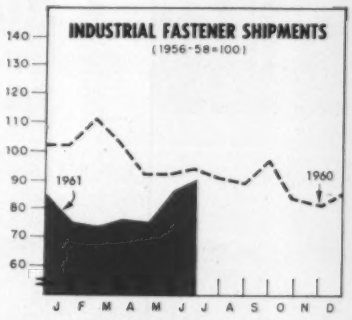
Here's a sampling:

• *Heat Treating*—Billings for two consecutive months have shown signs of a comeback, reports the Metal Treating Institute. (See graph and table, above.) The June total was above the monthly average of 1959 and even with last year's average.

• *Industrial Supplies*—The new order index of the American Supply & Machinery Manufacturers' Association Inc. has been climbing continuously since February. It now stands at 201 (July, 1948=100), the highest mark since December, 1959. (See graph and table, above.)

• *Castings*—The first positive sign of improvement in the foundry in-





	Bookings 1961	Bookings 1960	Shipments 1961	Shipments 1960
Jan.	220.8	243.4	227.3	207.3
Feb.	218.3	278.6	214.4	230.2
Mar.	299.3	231.8	246.8	244.6
Apr.	241.9	249.2	233.9	234.8
May	198.0	246.9	239.1	241.3
June	220.0	269.8	245.4	253.6
July	....	217.5	....	210.8
Aug.	....	255.8	....	217.3
Sept.	....	197.9	....	223.5
Oct.	....	219.9	....	220.6
Nov.	....	198.9	....	226.7
Dec.	....	216.5	....	220.0
Avg	....	235.5	....	227.6

American Gear Mfrs. Assn.

(Seasonally adjusted)

	1961	1960	1959	1958*
Jan.	75	102	99	133
Feb.	74	111	105	117
Mar.	76	103	105	103
Apr.	75	92	119	102
May	86	92	119	111
June	90	94	129	120
July	...	91	112	133
Aug.	...	89	77	120
Sept.	...	97	92	141
Oct.	...	83	83	137
Nov.	...	81	80	134
Dec.	...	85	102	152
Avg	...	94	101	125

*1947-49 = 100.
Industrial Fasteners Institute.

dustry is the report for May, just released by the Department of Commerce. It shows that both shipments and backlogs for the three major types—gray iron, malleable, and steel castings—increased appreciably. While shipments increased earlier this year, in most cases it was at the expense of backlogs.

• *Gears*—After dropping in May to one of the lowest levels in recent years, sales of gears rebounded sharply in June, states the American Gear Manufacturers Association. (See graph and table above.) Shipments also advanced for the second consecutive month.

• *Appliances*—June data from the National Electrical Manufacturers Association confirm the government report that the appliance industry was partially responsible for the late second quarter rise in the Federal Reserve Board's industrial production index. NEMA's figures show that output in every major category topped the May figures—electric refrigerators, farm and home freezers, ranges, water heaters, dishwashers, food waste disposers, and dehumidifiers. In addition, five of the seven were ahead of the year-ago monthly figures. However, only two—dishwashers and food waste disposers—were ahead of 1960's first six months. Ranges and water heaters were practically even with the cumulative 1960 totals.

NEMA also reports that June production of air conditioners was 233,800 units, just under the comparable 1960 figure, but output for the first half held a 40,000 unit edge over the year-ago figure.

Maytag Co. stepped up its production schedules of clothes dryers and washer-dryers last week with the recall of about 200 persons.

• *Fasteners* — One of the chart watchers' mysteries has been the lackluster performance of the fastener industry, usually a sensitive bellwether. The mystery hasn't been solved, but the industry noted an upturn in shipments in both May and June, breaking a four month slump. (See graph and table above.)

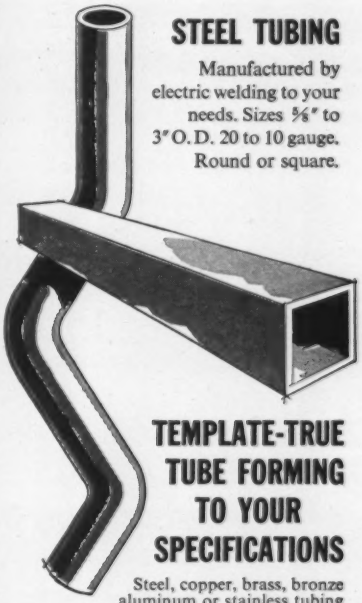
F. W. Dodge Sees Record

Construction is still counted on to give the economy a big boost in the second half. F. W. Dodge Corp. predicts contract awards will set a record this year. Since first half awards were slightly behind the record for that period, it could be assumed that increased activity is expected in the last six months.

NOW
TWO
FORMED
TUBES
PLANTS
to serve you

1. Sturgis, Michigan
In heart of metal working industry.
Seven large truck line terminals.
New York Central and
Pennsylvania Railroads.

2. Haleyville, Alabama
Convenient to Birmingham.
On U. S. Highway 278.
Southern and Illinois Central Railroads.



STEEL TUBING
Manufactured by electric welding to your needs. Sizes ⅝" to 3" O.D. 20 to 10 gauge. Round or square.

TEMPLATE-TRUE TUBE FORMING TO YOUR SPECIFICATIONS
Steel, copper, brass, bronze aluminum or stainless tubing fabricated to your specifications. Sizes ⅜" to 6" OD, 20 to 10 gauge.
Thirty-four years of experience in forming, welding, beading, bending, stamping of formed tubes.
Top-flight engineering service.
Write, wire or phone for booklet or quotation.
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Formed Tubes, INC.

Ohio Rolls

Shaping Metal for all Industry

THE OHIO STEEL FOUNDRY COMPANY
LIMA, OHIO

OHIO IRON and STEEL ROLLS

Carbon Steel Rolls	Flintuff Rolls	Denso Iron Rolls
Ohioloy Rolls	Double-Pour Rolls	Nickel Grain Rolls
Ohioloy "K" Rolls	Chilled Iron Rolls	Special Iron Rolls
Nioloy Rolls	Forged Steel Rolls	

PLANTS AT LIMA AND SPRINGFIELD, OHIO. *. Virtually at the center of the Steel Industry*

OR-44

JAMES H. TAYLOR
Emhart Mfg. appointment

JAMES J. WALL JR.
Electric Machinery sales

PETER STEFAN
Cannon-Muskegon sales mgr.

ROBERT A. CHARPIE
new post at Union Carbide

James H. Taylor was named manager of products and market planning for **Emhart Mfg. Co.**, Hartford, Conn.

Chrysler Corp. appointed **John von-Rosen** director of corporate manufacturing staff and services, responsible for corporate material handling, manufacturing engineering, industrial engineering, and administrative services.

Vickers Inc., division of Sperry Rand Corp., promoted **Roy Golze** to the newly created position of Midwestern regional manager in the Industrial Sales Dept., Machinery Hydraulics Div., in Chicago.

C. H. Stewart has been named manager of the Garland, Tex., Works of **U. S. Steel Corp.'s** Oil Well Supply Div.

United Shoe Machinery Corp. has appointed **Edward E. Tschantz** to the newly created post of chief engineer of the Fastener Div. He will be at United's Shelton, Conn., plant.

Electric Machinery Mfg. Co., Minneapolis, has named **James J. Wall Jr.** to the post of general sales manager.

Peter Stefan has been named sales manager of **Cannon-Muskegon Corp.**, Muskegon, Mich.

Duriron Co., Dayton, Ohio, appointed **James M. Williamson** director of purchases and promoted **Paul E. Jones** from assistant purchasing agent to purchasing agent.

George M. Burrier has joined **Inland Steel Co.** as assistant general manager in charge of primary production at the Indiana Harbor, Ind., Works.

Raymond S. Fries is manager of manufacturing and engineering of the **Brown Instruments Div.**, Philadelphia, Minneapolis-Honeywell Regulator Co., a new post. He has been with Honeywell for 17 years.

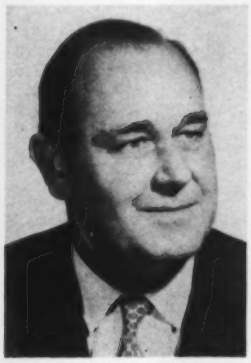
Frank H. Turbyville Jr. has been named plant manager for the new Lockeford, Calif., plant of **Graver Tank & Mfg. Co.**

Robert A. Charpie has been appointed manager of advanced developments for **Union Carbide Corp.**, New York. He had been assistant director of Oak Ridge National Laboratory, operated by Union Carbide, since 1955.

Richard Davis has been named product sales manager for gasoline-powered lift trucks and towing tractors of 1000 through 10,000 lb capacity at the Industrial Truck Div. of **Clark Equipment Co.**

Hilliard Y. Smuck is the new president of **Quaker State Metals Co.**, Lancaster, Pa., a division of Howe Sound Co. He has been chief executive officer, general manager, and vice president for sales of the company.

Lukens Steel Co., Coatesville, Pa., has appointed **William E. Mullestein** vice president and general manager. He has been vice presi-



EDWARD E. TSCHANTZ
United Shoe promotion

RAYMOND S. FRIES
Brown Instruments appointment

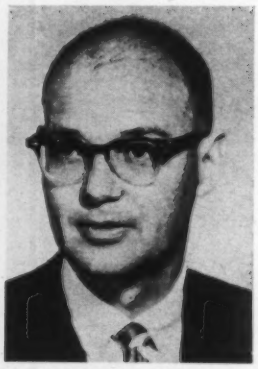
FRANK H. TURBYVILLE JR.
Graver Tank plant mgr.

WILLIAM E. MULLESTEIN
Lukens Steel v. p., g. m.

ROBERT V. MERRELL
Atkins Saw v. p.-sales

RALPH J. TEEPLE
Page Steel sales mgr.

C. C. DYBVIG
Dana v. p.-marketing



WILLIAM SORENSEN
elected Kelite president

dent-administration since 1957.

Atkins Saw Div., Greenville, Miss., Borg-Warner Corp. has appointed **Robert V. Merrell** vice president-sales. He formerly was sales manager.

American Steel & Wire Div. of U. S. Steel Corp. has transferred **James E. Brown** to Waukegan, Ill., to the newly created position of general superintendent, Waukegan. He will be the ranking Wire Div. officer in that community.

Donald C. Storch has been named corporate manager of purchases of **American Can Co.**, New York.

Sheldon K. Howard has been named to the new position of director of marketing of the Beloit, Wis., group of **Fairbanks, Morse & Co.**

W. K. Jones has been elected president of Heckett Engineering Co., Butler, Pa., a division of Harsco Corp. He was executive vice president of the division.

Ralph J. Teeple was made sales manager, **Page Steel & Wire Div.**, Monessen, Pa., American Chain & Cable Co. Inc. He was New York regional sales manager.

Michael F. Schaible became president of **Commercial Filters Corp.**, Melrose, Mass., simultaneously with the merger of CFC and RAD Inc., Cincinnati. **Robert L. Fielding** will be vice chairman. **Alfred F. Duemler Jr.**, has been named vice president and treasurer; **Carl F. Holland** has become general sales manager.

Charles E. Altmeyer has been elected executive vice president of **Chandeysson Electric Co.**, St. Louis.

G. M. Diehl Machine Works Inc., Wabash, Ind., named **Charles W. Tuttle** president, effective Sept. 1.

Judson L. Thomson Mfg. Co. Waltham, Mass., has appointed **Douglas Downes** vice president in charge of engineering.

C. C. Dybvig has been appointed to the newly created position of vice president of marketing at **Dana Corp.**, Toledo, Ohio. He was vice president-sales.

William Sorensen was elected president of **Kelite Corp.**, Berkeley Heights, N. J., succeeding **L. C. Sorensen**, who will remain as chief executive officer. **Louis McDonald** was elected executive vice president.

I. C. Maust has been appointed vice president and general manager of Bendix Corp.'s **Micrometrical Mfg. Co.**, Ann Arbor, Mich., succeeding **F. A. Zander**, who has retired.

Michael K. Tudor has been named executive vice president of **Micro Metals Corp.**, Passaic, N. J.

John G. Getz Jr. has been made executive vice president of **Silver Creek Precision Corp.**, Silver Creek, N. Y.

Townsell G. Marshall has been appointed manager of contract admin-

W. K. JONES
Heckett Engineering chief

CHARLES W. TUTTLE
G. M. Diehl president

DOUGLAS DOWNES
Judson L. Thomson v. p.

TOWNSELL G. MARSHALL
contract mgr. at Armco

"EVEREADY" Your "green light" to safety... *with savings*

Save $40 yearly per oil switch lamp by electrifying with "EVEREADY" batteries!

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With "EVEREADY" "Air Cell" batteries you get virtually 100% unattended operation— through dependable, low-cost, all-weather packaged power • Just add water— use them up and throw them away • Get the full story on the savings you will realize by electrifying your switch lamps with "EVEREADY" "Air Cell" batteries!

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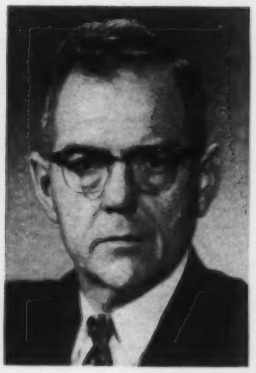
UNION CARBIDE

JACK S. PARKER
GE v.p., group executive

A. W. PETTIT
Weirton Steel sales post



JAMES O. DAGUE
Bethlehem Steel promotion

WILLIAM A. MEITER
in Washington for Worthington

istration at **Armco Steel Corp.**, Middletown, Ohio.

Jack S. Parker is the new vice president and group executive in charge of the Electronic & Flight Systems group, New York, **General Electric Co.**, succeeding **Cramer W. LaPierre**, recently elected executive vice president.

Texas Instruments Inc., Dallas, has made the following changes in its management: **Mark Shepherd Jr.**, is executive vice president responsible for all company operating activities; **S. T. Harris**, senior vice president responsible for corporate development; **W. F. Joyce**, senior vice president responsible for the Apparatus Div.

Edward H. Perkins Jr. has been elected president of **Brooks & Perkins Inc.**, Detroit. He formerly was executive vice president and general manager. **Douglas S. Ferguson** has been appointed general sales manager.

In a series of changes at **National Steel Corp.**, **A. W. Pettit** has been appointed assistant vice president of sales at the **Weirton Steel Div.**, Weirton, W. Va.; **John J. Gallagher** succeeds him as general manager of sales.

James O. Dague has been promoted to general manager of the Steelton, Pa., plant of **Bethlehem Steel Co.** He succeeds **Walter B. Lang**, retiring after 44 years of service.

E. L. Weden Jr. has been appointed general superintendent of **Republic Steel Corp.'s** Youngstown District. **G. J. Erdos** succeeds him as superintendent of the continuous weld tube mills. **W. R. DuChanois** will be superintendent of the Transportation & Labor Department. In Republic's Warren, Ohio, District, **Richard F. Armitage** has been named district manager, succeeding **R. C. Gintert**, retiring after 44 years with the company. In the Central Alloy District, **Roland M. Miller** has been made superintendent of the Electrical Dept. at Massillon, Ohio, and **Charles K. Pickering** superintendent of the Electrical Dept. at Canton. At the Union Drawn Steel Div. at Massillon, **Glenn A. Johnson** has been named chief engineer. At the corporation's South Chicago steel plant, **Eugene R. Mackey** has been appointed superintendent of the coke plant.

William A. Meiter is filling the new post of vice president-Washington services for **Worthington Corp.**, Harrison, N. J.

OBITUARIES...

Dr. Anson Hayes former vice president in charge of research at **Armco Steel Corp.**, Middletown, Ohio, died July 25.

Carl A. Bergstrom, 79, founder and chairman of **Weldon Tool Co.**, Cleveland, died July 31.

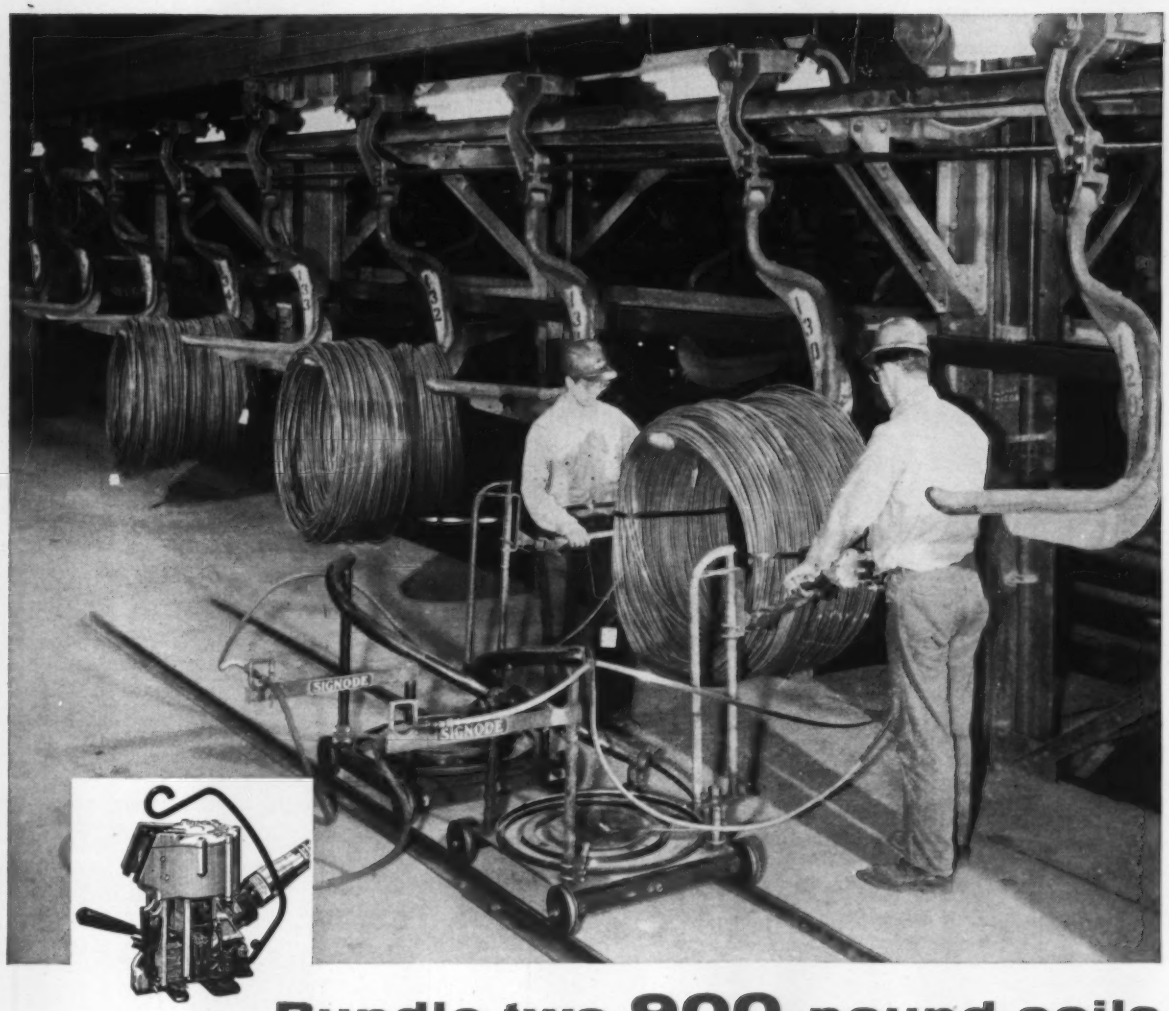
Dudley S. Blossom Jr., Cleveland, died Aug. 3 of a heart attack. He was secretary and director of **Bearings Inc.**, and president of **Cleveland Electro Metals Co.**

EDWARD H. PERKINS JR.

DOUGLAS S. FERGUSON
executive changes at Brooks & Perkins

E. L. WEDEN JR.

RICHARD F. ARMITAGE
new district positions for Republic Steel



Bundle two 900-pound coils on moving conveyor in 30 seconds

Two operators—each using a Signode AMP all-power strapping tool and working in unison—put two steel straps around two 900-pound coils of green rod in 30 seconds!

This setup, which permits making full use of the speed of the AMP, was developed by the manufacturer. It incorporates a mobile strapping station that rolls on tracks paralleling the conveyor line. As the operators work, they move along with the conveyor hook that holds the two coils being strapped. When the strapping operation is completed, they move back to the starting point...30 seconds later. Coils are compressed 30% by the strapping.

The Signode AMP is compact, well-balanced, weighs only 22 pounds. Press a trigger and air power tensions the strapping; press another and air power seals and cuts off the strapping from the coil. The AMP uses new, easy-loading NESTACK seals, which come in nested stacks that eliminate waste and delay. The tool is available for 5/8" and 3/4" strapping, .015" to .035" gauge. Special high-tension models are available.

Let us send you additional information on the Signode AMP tool, or, if you prefer, call the Signode man near you.

First in steel strapping

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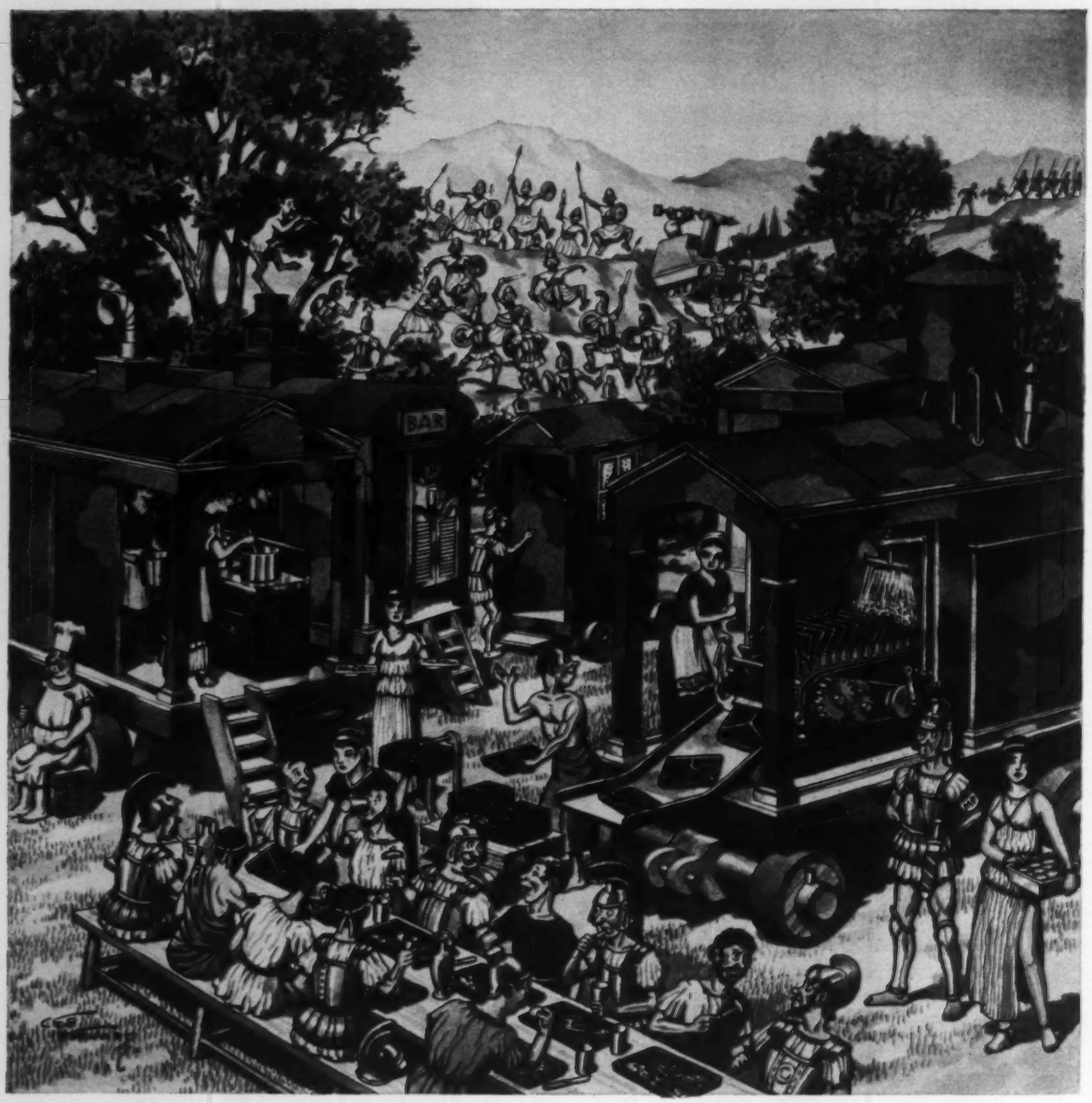
STEEL STRAPPING CO.
2645 North Western Avenue • Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide
In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto

Why Alexander's Army was Battle-Hungry

Alexander-the-Great was the top military leader of all time for a good non-military reason. He perceived that an army "travels on its stomach" so he provided stainless steel mobile kitchens for the sake of good taste. His soldiers literally "fought to eat."

Cleverly he used Washington Steel's ColorRold Stainless to camouflage the units—keeping his great secret weapon wholly unknown to the world until the accompanying sketch was unearthed recently from the grave of an early mess sergeant.

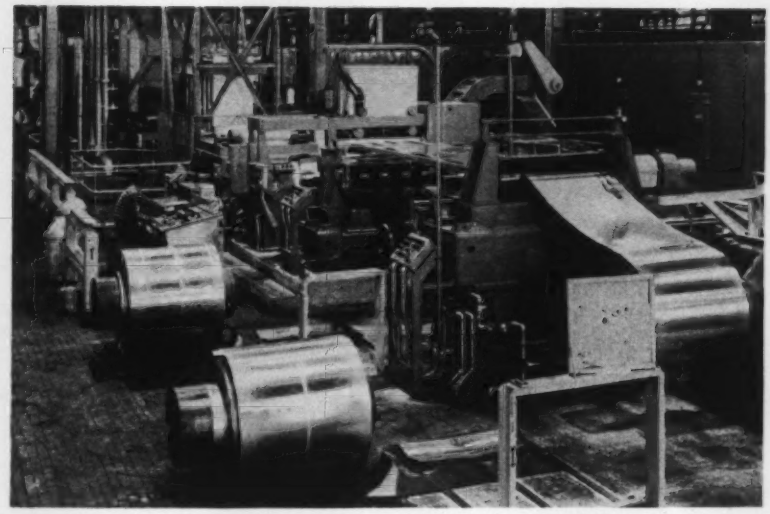


To be assured of good taste, always insist on stainless steel in food service equipment. Washington Steel's ColorRold Stainless enables you to enhance the beauty of your quality product—whether you are building a skyscraper, a space vehicle or a soup tureen. Go First Class, Go Stainless!

WASHINGTON STEEL CORPORATION

PRODUCERS OF *MicroRold*® and *ColorRold*® STAINLESS SHEET & STRIP

WASHINGTON, PA.



Aluminum processing facility completed as . . .

Kaiser Seeks Larger Share Of Widening Can Market

A NEW BID for a larger share of the can market comes from Kaiser Aluminum & Chemical Corp., Oakland, Calif. Coated coils and uncoated sheets and coils are being produced on the company's new, automatic, aluminum can stock finishing line at its Trentwood, Wash., Works.

Coated coil stock is expected to be particularly attractive to smaller can manufacturers since they do not maintain their own coating facilities. Many can producers purchase flat sheets and farm them out for coating or lithography.

Company officials say the $2.5 million facility is the first specialized mill for the production of one product. Described as "a step out of job shop operation," the company looks for long run, shelf item production.

• **Sales Sights Set**—A new target: The tuna and salmon can market. This "natural market" could mean sales of 49 million lb of aluminum if fully realized, says John F. Delany, manager, can sales market. Aluminum made its first can market invasion in oil packaging. In the 1960-61 season, it made big inroads in the Florida citrus market.

"At least 50 per cent (and up to 70 per cent) aluminum was used for the 6 ounce juice can last season," says Mr. Delany. "Since 1.5 billion 6 ounce cans were produced, that means at least 24 million lb of aluminum were used."

Another market: The composite can market, which is huge, Mr. Delany says. The composite can has a fiber body and metal ends. Current rates show 10 million lb of aluminum for that use, and a potential of 50 million lb a year.

• **Aluminum's Share**—"We're after the feasible aluminum markets," says Mr. Delany. "If the aluminum industry got 10 per cent of the can market, it would be a healthy figure."

"Use of aluminum for cans in the food, beverage, and industrial fields is rapidly expanding," says W. J. Edmunds, general manager, Kaiser Industrial Div. "From about 40 million lb of the metal used for cans in 1960, we estimate that more than 100 million lb of aluminum will be utilized during 1961," he says. To this Mr. Delany adds: "Aluminum can penetration has barely started. I believe we can maintain the numerical growth pace set in the last year."

• **Trentwood Operation**—Complete equipment at Trentwood includes a degreasing and flattening line (shown at left), a coating line, and a classifying line.

The degreasing and flattening unit is designed to accommodate coiled strip in widths from 20 to 40 in. and in various gages, for trimming, cleaning, and leveling operations. Over-all length of the unit is 230 ft. Aluminum moves through the unit at speeds up to 600 fpm.

The coating installation degreases the coiled aluminum strip in a five tank pretreatment section, and an organic coating is applied to one or both sides of the strip. It is then passed through a 180 ft oven for baking, through trimming operations, and is rewound into coil form for further processing or shipment.

Park Works Being Sold

Liquidation of the equipment and personal property at Crucible Steel Co. of America's Park Works, Pittsburgh, is underway. Hetz Constructors Inc., Warren, Ohio, is making a study and engineering plans to carve up the divisions of this 22.25 acre plant, with its 700,000 sq ft of buildings, into suitably sized parcels to accommodate smaller operations. The exclusive for the real estate has been given to Arthur F. Texter & Associates, Wilkinsburg, Pa.

ASSOCIATIONS

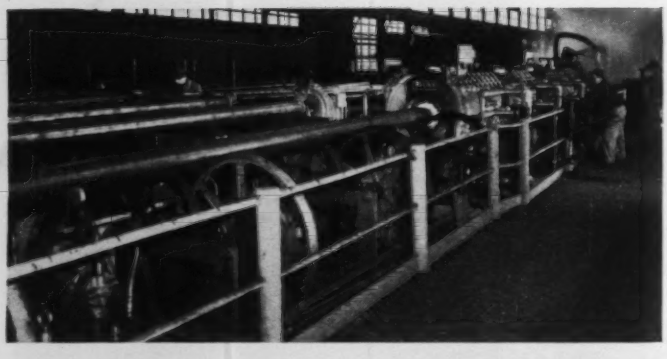
Officers of **Metal Finishing Suppliers' Association Inc.** include: President, J. G. Carrique, Alloycraft Ltd., Montreal, Que.; first vice president, Dr. H. L. Kellner, Lea Mfg. Co., Waterbury, Conn.; and second vice president, R. M. Norton, Hanson-Van Winkle-Munning Co., Matawan, N. J.

Association of Data Processing Service Organizations, Abington, Pa., elected these officers: President, Romuald Slimak, Remington Rand Univac Div., Sperry Rand

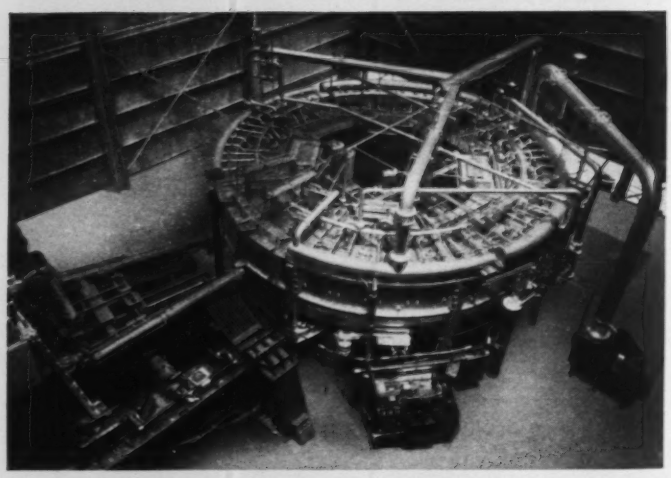
(*Please turn to Page* 116)

NEW SLANTS ON HEAT PROCESSING FROM SELAS

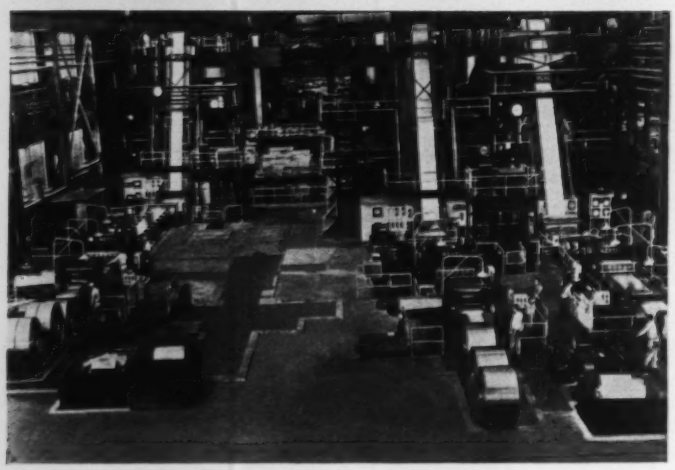
Here's how the Steel Industry uses Selas Heat Processing



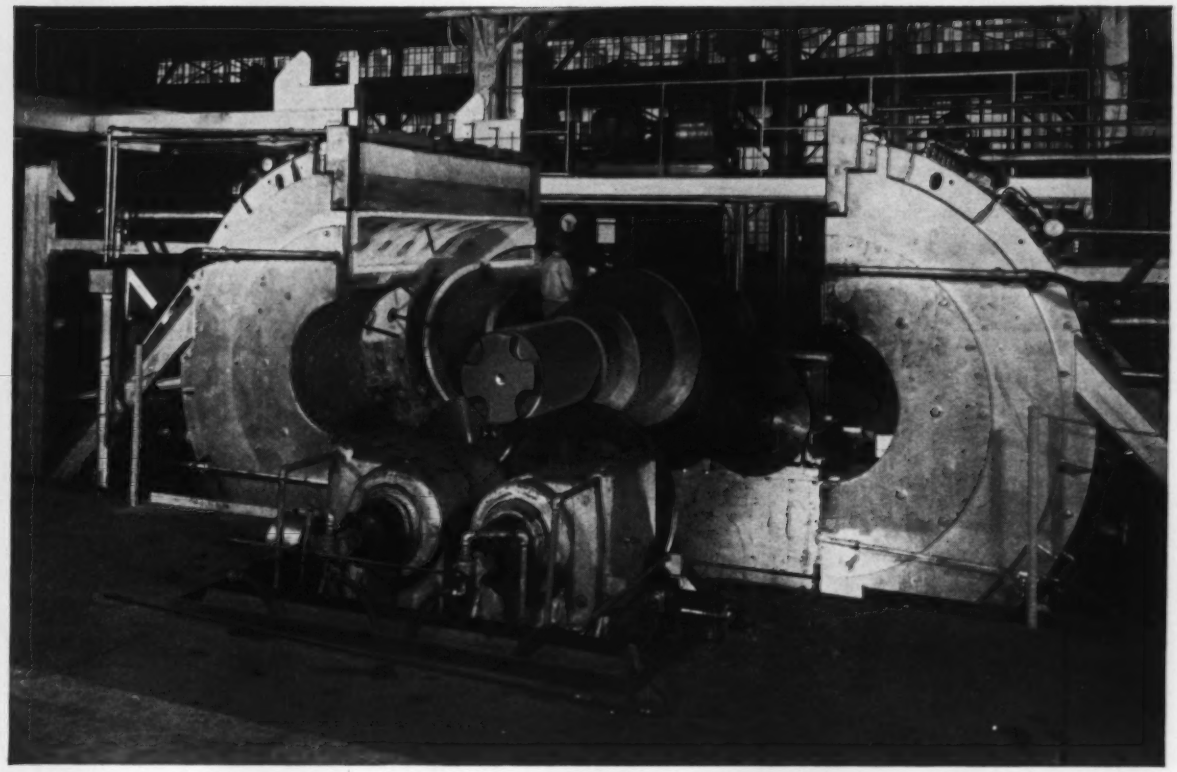
SEAMLESS TUBING *for oil-country application is hardened and tempered in this Selas continuous barrel-furnace line. The tubing is heated to 1600°F in five barrel-furnaces, uniformly quenched by annular water-spray unit, automatically transferred, then tempered in succeeding five barrel-furnaces. Rotation of the work during its forward motion through heating, quenching and tempering assures uniformity of physical properties and maximum straightness.*



STEEL BILLETS *of varying sizes for extruding are heated from room temperature to 2300°F in this Selas automatic, indexing rotary hearth furnace. This compact furnace, occupying floor space only 32' diam., has 32,500 lb. hourly capacity. Automatic mechanism loads and unloads 213-lb. billets on hearth at rate of 150 pcs/hr.*



STRIP STEEL *to 48" wide from cold reduction mill is in-line annealed and galvanized, without prior washing or pickling, or batch annealed strip is pre-heated and galvanized . . . continuously and at high speed . . . in these Selas GRADIATION® heat processing lines. Hard steel is rapidly pre-heated to produce galvanized hard sheet of superior coating quality and eye-appeal, or batch-annealed strip is uniformly pre-heated to selected temperatures producing galvanized sheet with adherent coating and good drawing properties.*



ROLL HARDENING *by* GRADIATION® *heating in this Selas split-cylinder type furnace makes practical a heat treatment that is difficult or impossible to achieve by other more conventional methods. Hardening the working surface of mill roll bodies to uniform, controlled depth, this versatile unit accommodates 49" to 56" O.D. rolls having neck diameters 12" to 46", and face lengths 42" to 98".*

THROUGHOUT the steel industry Selas GRADIATION® heat processing is used advantageously in many operations. The versatility and adaptability of the GRADIATION principle are demonstrated by the diversity of applications shown in the installation photographs on these pages.

GRADIATION is the modern concept and technique of economical heat processing which coordinates fast, controlled heating with the nature of the workpiece . . . considering its composition, size, shape, heat transfer characteristics . . . to develop desired product quality and physical properties in minimum time, with maximum efficiency, utilizing automatic, compact equipment.

Designed and custom-built to meet your specific heat processing needs . . . for hot working . . . annealing and galvanizing . . . tinning . . . heat treating heavy sections and special shapes . . . GRADIATION equipment assures high production rates, minimized handling, upgraded quality, and economical utilization of floor space.

At your convenience . . . without cost or obligation to you . . . a Selas field engineer would welcome the opportunity to survey your needs. For this personal service—or for a copy of our new Bulletin "Selas GRADIATION Heating in the Steel Mill"—contact our Steel Mill Division Office, 300 Mt. Lebanon Blvd., Pittsburgh 34, or our Furnace Division, Dresher.

GRADIATION and DURADIANT are registered trademarks of Selas Corporation of America.

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SELAS

HEAT AND FLUID PROCESSING ENGINEERS

DEVELOPMENT
•
DESIGN
•
CONSTRUCTION

URICK'S URITE GRAY IRON

Wt. 190 lbs.

GEARED TO THE JOB

URICK Foundry's integrated sales and engineering departments are geared directly to the production department —all working together to supply high quality gray iron castings with dimensional stability, uniform density, and high machinability.

From the planning stage, all the way to the finished part, URITE gray iron castings are designed and engineered to deliver greater tensile strength in relation to the service required, and in many cases with less weight. URITE gray iron is better because it is cast with fine flake graphite uniformly distributed throughout the iron matrix.

URICK'S modern facilities, manned by a competent co-operative team, produces quantities of high grade castings to meet the most demanding schedules.

Contact URICK, the foundry that starts with "U" and stays with you. Write for advanced technical data about URITE gray iron castings.

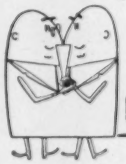
URITE CASTINGS

URICK FOUNDRY

DEPT. S-2 ERIE, PENNSYLVANIA

(*Concluded from Page* 113)

Corp., New York; vice president, Z. V. Zakarian, Radio Corp. of America, New York; treasurer, C. G. Green, Statistical Reporting & Tabulating Ltd., Toronto, Ont.; and executive vice president, W. H. Evans.



CONSOLIDATIONS

Reed Roller Bit Co. purchased **Diamond Metal Co.** Both are in Houston. Diamond Metal makes tungsten carbide surfacing materials and castings and a line of "tungsten heavy metal" (used as a shield against radiation). Diamond Metal will be operated as a division under the direction of J. R. Henderson.

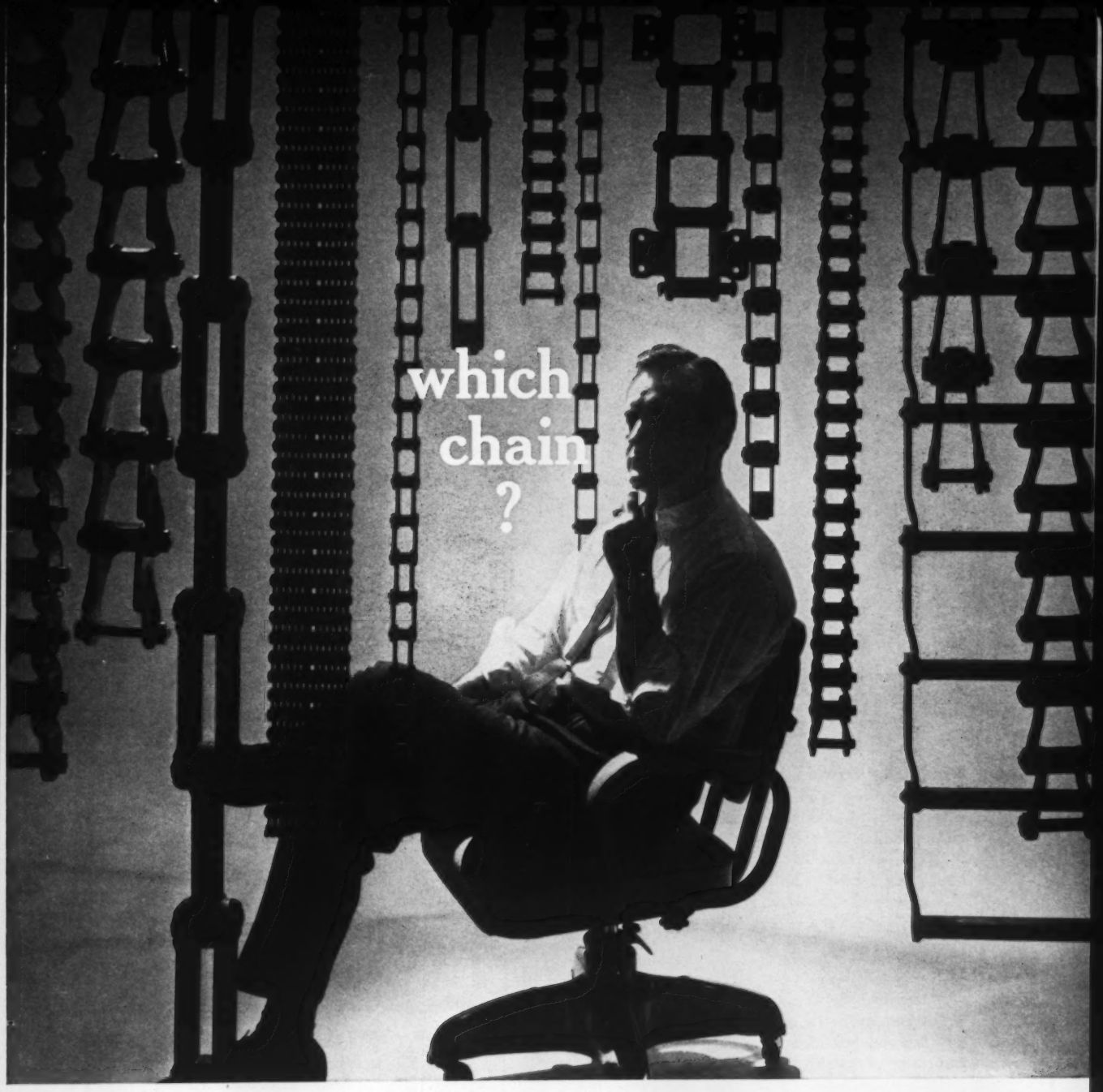
Reduction & Refining Co. Inc., a newly organized subsidiary of P. R. Mallory & Co. Inc., Indianapolis, purchased the metallurgical business and operating assets of **Reduction & Refining Co.** at Kenilworth, N. J., producer of refractory metals. The new subsidiary will continue to supply refractory powders and oxides to Mallory Metallurgical Co., a division of P. R. Mallory & Co. Inc. which makes electrical contacts and assemblies, special metallurgical products, and resistance welding materials.

Brunswick Corp., Chicago, and **Kiekhaefer Corp.**, Fond du Lac, Wis., manufacturer of outboard motors, and marine accessories, have merged. Kiekhaefer will be operated as a subsidiary under its present management.

Steel Co. of Canada Ltd., Hamilton, Ont., has offered to purchase **Canadian Drawn Steel Co. Ltd.**, that city, producer of cold drawn steel bars.

Cenco Instruments Corp., Chicago, acquired **Instru-Coil Co.**, Cincinnati, maker of precision springs and coils, and will operate it as a subsidiary.

Atronic Products Inc., West Conshohocken, Pa., merged into **General Atronics Corp.**, Bala-Cynwyd, Pa. Atronic Products specializes in signal enhancing equipment and automatic selecting, routing, sens-



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OFFERING YOU HUNDREDS OF STANDARD CHAINS—Link-Belt can help you choose the one chain that's precisely *right* for your power transmission or conveying application. Each chain is as individual as a thumbprint, with characteristics mated to specific job needs. And Link-Belt experience is at your service—to help you evaluate particular performance factors . . . to save you time in choosing the one best chain for your application (in terms of high efficiency, low *total* cost). Contact your nearby Link-Belt district office or authorized stock-carrying distributor. Ask for catalog 1050 covering the complete line of Link-Belt products and components for materials handling and power transmission.

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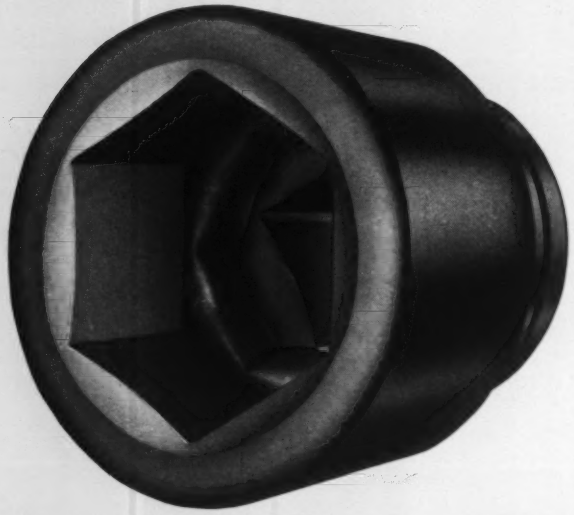
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15.714

Snap-on

Industrial Sockets



BUILT EXTRA TOUGH... to take a beating

Just ask a SNAP-ON sales engineer about companies that have cut socket breakage and increased output by switching to SNAP-ON. These built-to-take-it industrial sockets have the extra heft, accurate dimension and special steel toughness to stand up to day-in, day-out production and maintenance work. Result: more work hours per socket — far less downtime due to socket failure.

Wide range to fit your needs!

SNAP-ON sockets are built in a wide range of sizes in ¼-in., ⅜-in., ½-in., ¾-in., 1-in., 1½-in., 2½-in. and 3½-in. square drive. Socket varieties include standard lengths, bolt clearance lengths, thin-wall types, magnetic sockets; special shapes for self-tapping screws and tapered hex nuts; semi-flexockets and full flexockets; plus a full range of extensions and handles.

Talk sockets with your SNAP-ON man. He's a tool specialist who can offer competent advice on what's best for you in SNAP-ON's complete range of industrial sockets. Be sure to specify if sockets are for hand use or for power nut running or for power impact use. SNAP-ON makes different sockets for all these uses.

Service as near as your phone!

SNAP-ON industrial wrenches and mechanic tools are quickly available from stock warehoused at regional industrial and branch sales offices. You get fast action on regular or emergency needs. Write now for new 180-page industrial catalog.

FOR ALL INDUSTRY

SNAP-ON TOOLS

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ing, and control devices and systems for material handling operations. The property will be operated as the Atronic Products Div.

NEW PLANTS

Cleveland Crane & Engineering Co., Wickliffe, Ohio, established a West Coast Tramrail Div. with plant at 6435 Corvette St., Los Angeles, Calif. It is equipped with engineering and shop facilities. Limited manufacturing will be carried on as required to enable "tailoring" of special equipment to unusual material handling situations. Karl Pamer is manager of the division.

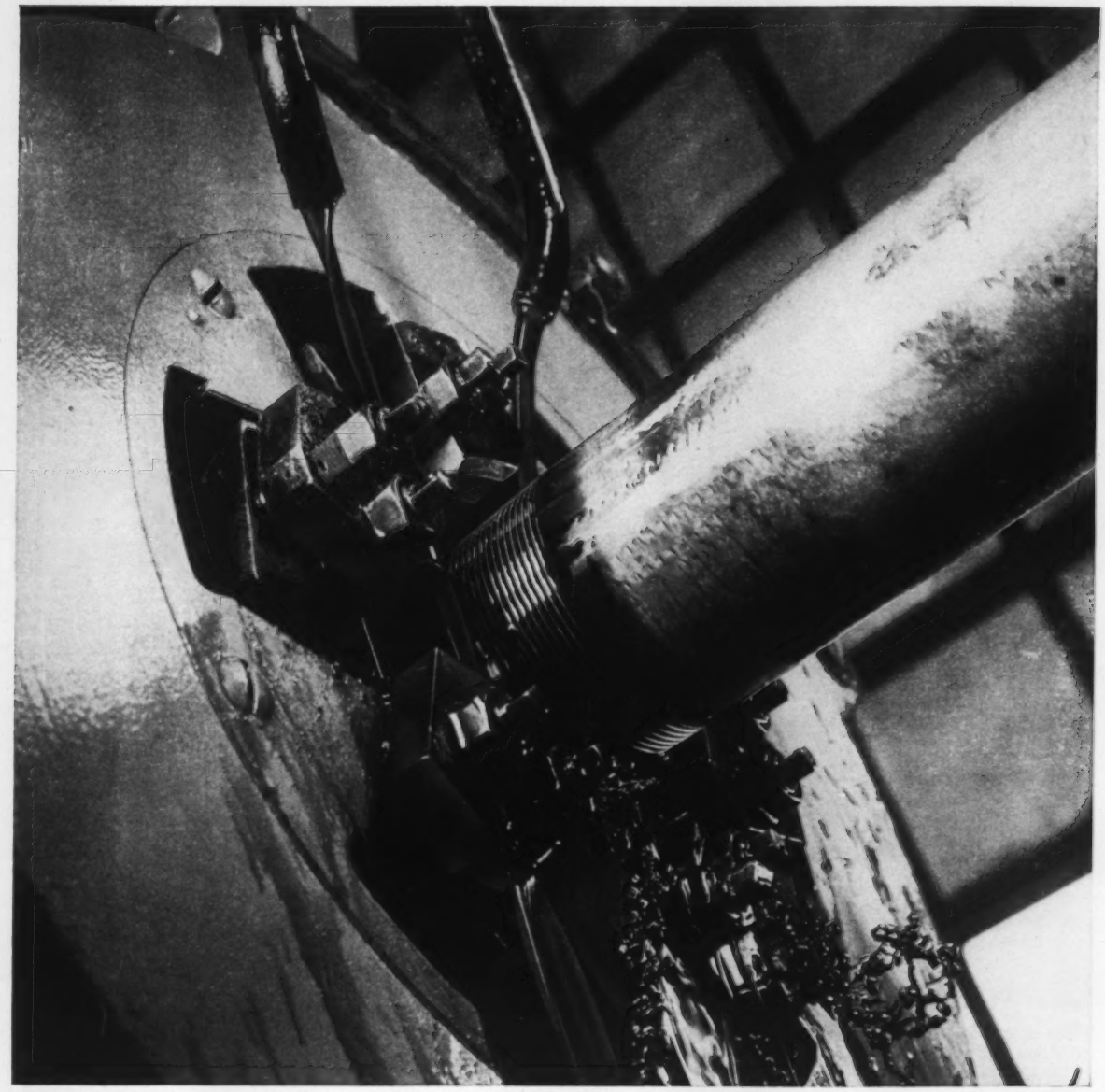
Lincoln Electric Co., Cleveland, established a combination office-warehouse in St. Louis. The facility contains 3280 sq ft of floor area for warehousing upward of 500,000 lb of welding electrodes, 100 welding machines and three phase, ac, squirrel cage, induction motors.

General Bearing Co. Inc., West Nyack, N. Y., opened a warehouse and office at 3500 N.W. 50th St., Miami, Fla.

U. S. Aluminum Siding Corp., Franklin Park, Ill., opened a multi-million dollar manufacturing plant in that city. The 56,000 sq ft plant is equipped to process aluminum coils into building products. Facilities include roll forming, embossing, trimming, and cutting machinery.

Northwestern Metal Co. is building an automated, nonferrous, smelter and scrap handling facility in Lincoln, Nebr. The 67,000 sq ft plant will be equipped with gas fired, reverberatory melting and holding furnaces for aluminum, brass, and white metal. Conveyorized ingot molding machines and metal handling equipment will be installed. The plant is scheduled for full operation by Nov. 1.

Perfect Gear & Instrument Corp. has combined administrative and sales offices with manufacturing and test facilities in a 20,000 sq ft building at 339 S. Isis, Inglewood, Calif. The factory is equipped for



HOW TO CUT THE COST OF CUTTING!

Esso supplies a wide range of special and multi-purpose products designed to save you money on tool replacement, to boost output, and to reduce downtime...

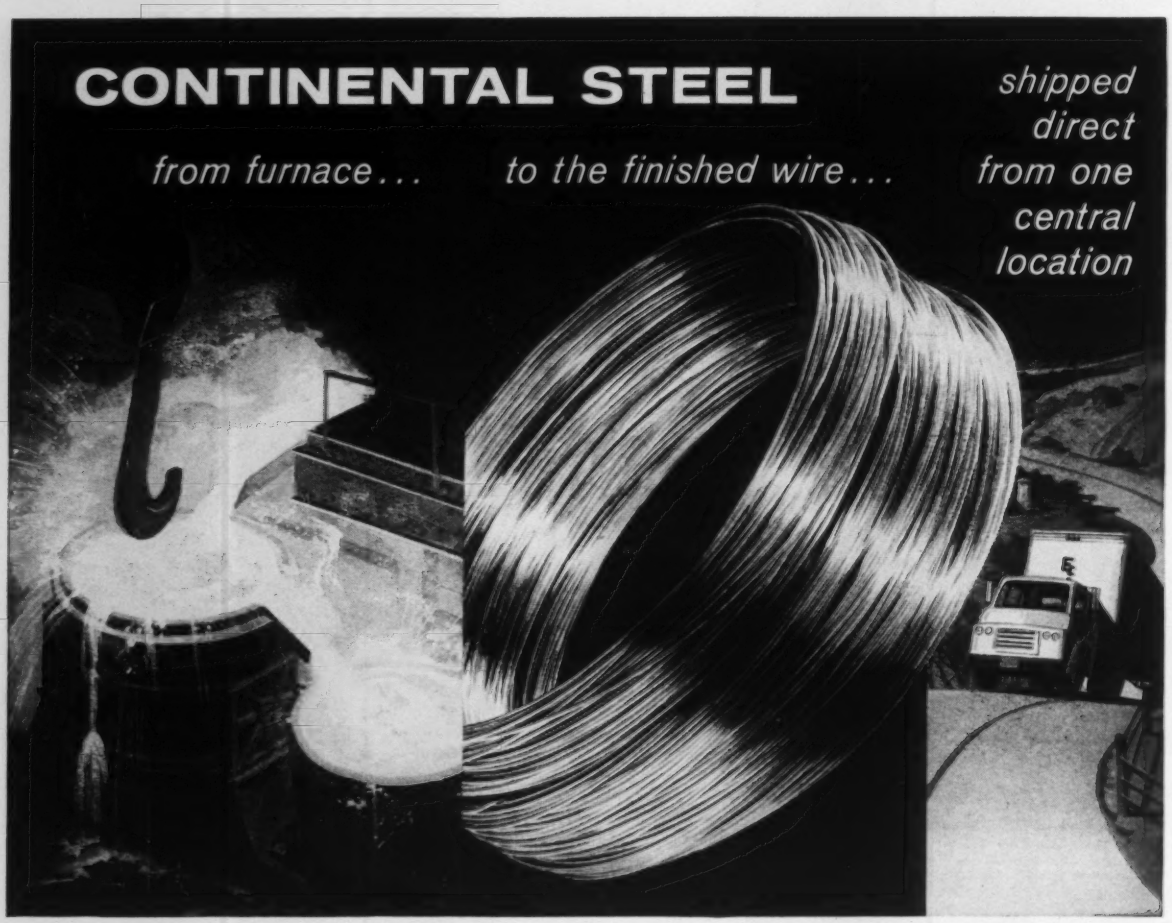
PENNEX® cutting oils provide low tool wear in threading, tapping, and machining operations on ferrous metals. They are compounded with fatty materials for peak cutting efficiency; offer high sulfur activity for fine surface finishes.

NEBULA® EP multi-use grease serves *all* grease-lubricated parts, even those which require extreme pressure properties. Nebula EP has excellent oxidation stability, works well at high temperatures, and simplifies handling by replacing many single-purpose greases.

NUTO® high-quality hydraulic and circulating oils give effective protection against rust and oil breakdown; do a top-notch lubricating job in gear drives, bearings, and circulating systems.

Your Esso Representative can help you cut costs in many areas of your operations. Give him a call, or write us at 15 West 51st Street, New York 19, New York.

HUMBLE OIL & REFINING COMPANY



GIVES YOU DIRECT LINE SERVICE IN WIRE

BRYTITE®—New patented galvanizing process with a tight, brilliant bright coating that takes severe forming without flaking, powdering or peeling.

TINNED—outstandingly smooth and lustrous, so bright that it can replace plated wire for many products.

KOKOTE®—Redrawn galvanized wire with unusually bright chrome-like lustre.

UPHOLSTERY SPRING WIRE—high carbon spring wire for automatic Coiling and Knotting and other types of upholstery construction.

MB HARD DRAWN SPRING WIRE—for severe deformation in the fabrication of mechanical springs. Sizes for many uses.

Here are unique advantages of using Continental Wire: All our operations are in Kokomo—there is no criss-cross misrouting or multi-handling, no red tape involved when you write or call in your order, or hand it to your Continental representative, *no follow-up delays*. You get the kind of personalized service that will please you. And you get seasoned, knowledgeable assistance from a trained wire specialist on any wire problem. Try Continental direct line service and see! Write today for your free copy of our new wire manual.

CONTINENTAL STEEL
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PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, **KOKOTE®**, **BRYTITE®**, **FLAME SEALED®**, Coppered, Tinned, Annealed, Liquor-Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric. Nails, Continental Chain Link Fence and other products.

WIRE SPECIALISTS FOR OVER HALF A CENTURY

Steel

design and manufacture of precision gears, instruments, magnetic clutches, and related components.

NEW ADDRESSES

Southern Metallurgical Co. moved into a larger leased building at 1115 N. Utica Ave., Tulsa, Okla. Additional machinery has been installed in the 4000 sq ft quarters. The firm provides a special service for cleaning, grinding, and honing metal parts requiring an extremely fine finish.

Max Zuckerman & Sons and its affiliated company, **Maryland Alloys Corp.**, moved to their new plant on Music Fair Road, Owings Mills (Baltimore), Md.

Hughes Aircraft Co., Culver City, Calif., moved its nucleonics laboratory to its Ground Systems Group at Fullerton, Calif. Dr. J. W. Clark is manager of the laboratory.

Futurmill Inc., Pontiac, Mich., transferred its operations to 19720 W. Eight Mile Rd., Southfield, Mich. The firm makes milling cutters, planer conversion spindles and accessory equipment, and other milling and metal removal tools.

Metal Masters Co. moved to 2601 W. Diversey Ave., Chicago, Ill. The plant contains 8000 sq ft of floor space, more than twice the area of the firm's previous building. The company designs and builds special industrial machines and equipment.

C&S Products Co. Inc., Detroit, will move all manufacturing and administrative facilities to DeKalb, Ill., Aug. 15. The firm makes foundry machinery and equipment. It is an affiliate of Barber-Greene Co., Aurora, Ill.

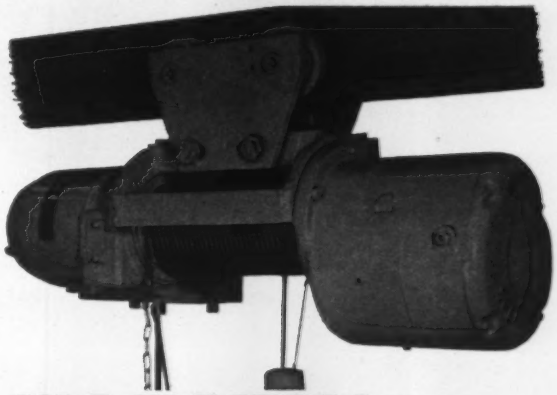
Tubular Products Div., Beaver Falls, Pa., Babcock & Wilcox Co., moved its district office to 11955 Shaker Blvd., Cleveland 20, Ohio.

Effective Aug. 14, John R. Dunlap, manager-alloys sales, **E. J. Lavino & Co.**, will have his office in the company's suite in the Oliver Bldg., Pittsburgh, Pa.

(*Please turn to Page* 124)

Introducing

a New Member of the Wright Speedway Hoist Family...



The W-1 ELECTRIC...BUILT TO YOUR NEEDS FOR SPEEDY, RUGGED DUTY IN CLOSE HEADROOM LOCATIONS

The W-1 Speedway is a hoist it will pay you to meet without delay. Completely new in design, it can be tailor-made to your exact job requirements for high handling efficiency, low maintenance costs and longer service life. You can choose the W-1 in capacities from 1 to 3 tons...with single, two-speed or variable speed controls... lug or base mounting; plain, geared or motorized trolleys...two or four part reeving. For close headroom application, the WH-1 is available in capacities of 1 to 2 tons. Both models can be equipped with Wright's own built-in overload cut-off for 3-way protection of operator, load and hoist. Hoists are factory tested at 50% above rated capacity before overload equipment is installed.

OTHER W-1 SPEEDWAY FEATURES

Motors—Fully enclosed, ball bearing type. Built to NEMA specifications and rated on basis of 30-minute duty cycle.

Bearings—Anti-friction, precision ball or roller bearings support both ends of all shafts. They are mounted in splash oil lubricated gear chamber.

Motor Brake—External expanding jaw, self-adjusting cam type; operated by solenoid.

Drum—Fabricated all-steel construction with liberal drum to cable diameter ratio to reduce wear and cable fatigue.

ACCO

See your Wright Distributor

for complete information about the W-1 or write us at York, Pa. for Bulletin DH-173

WRIGHT HOISTS

Wright Hoist Division • American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

A NEW HIGH NOTE IN HEEL FASHIONS

WITH COLD FINISHED STEEL BARS

Only steel could do the job. The designs for women's new super-slim, high-fashion heels required greater strength. Small diameters must withstand terrific pressure. The material must give, not break.

As have thousands of other manufacturers confronted with new product designs, heelmakers found the answer in a Bliss & Laughlin cold finished steel bar.

Bliss & Laughlin cold finished steel bars are used in countless products. They impart high strength with safety, from high-fashion heels to automobiles. They make small boys happy with sturdy bicycles and model engines. They help transmit power to huge earth-moving equipment and giant ocean liners.

Check out your designs with Bliss & Laughlin. As specialists in strength, finish, accuracy, straightness and machinability for 70 years, Bliss & Laughlin has recommended time and again the most suitable and economical bar from the industry's most complete line of cold finished steels.

Seven Bliss & Laughlin mills across the nation, collaborating with Steel Service Centers everywhere, assure highly personalized, local service!

The smallest cross section in this heel is only .14". Strength is provided by a C-1144 cold finished steel bar, heat treated to a Rockwell hardness of 35-38 after machining.

BL-617

Leading Independent Producer of Cold Finished Steel Bars

BLISS & LAUGHLIN

GENERAL OFFICES: Harvey, Ill. MILLS: Harvey, Ill., Detroit, Cleveland, Buffalo, Mansfield, Mass., Los Angeles, Seattle

Practical Idea for the Production Man

Efficient electric hoists...to move materials overhead and release floor space for more valuable operations.

CM HOISTS

CM LODESTAR ELECTRIC CHAIN HOIST
⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ⅛ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

CM METEOR ELECTRIC WIRE ROPE HOIST
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!

Rugged lightweight hand hoists and pullers...to make your job easier and safer

CM CYCLONE HAND HOIST
⅛ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER THE "ONE MAN GANG"
¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation. Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds. CM-Alloy flexible load chain.

ALSO... *CM Trolleys and Cranes*

Request catalog and name of local stocking distributor.

CM HOISTS

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CORPORATION
TONAWANDA, NEW YORK
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In Canada: COLUMBUS McKINNON LIMITED, ST. CATHARINES, ONTARIO

(*Concluded from Page 121*)

Fairbanks Co., New York, will move its Boston branch office and warehouse Aug. 15 to 767-A Concord Ave., Cambridge 38, Mass. The company makes valves, trucks, casters, wheels, and Dart unions.

Hancock Telecontrol Corp. opened its new headquarters at 320 Park Ave., New York 22, N. Y. The company moved from Jackson, Mich. The new quarters also house the firm's New York district sales office.

Datex Corp., Monrovia, Calif., subsidiary of Giannini Controls Corp., moved its Eastern regional sales and service office to 420 Broad Ave., Palisades Park, N. J. John E. Macalla is regional manager. The firm manufactures digital data recording and control systems.

NEW OFFICES

Wean Engineering Co. of Canada Ltd. opened a sales office at 15 King St. W., Hamilton, Ont. The office will handle the sales of ferrous and nonferrous strip processing equipment for Wean Engineering Co. Inc., Warren, Ohio, and McKay Machine Co., Youngstown. M. S. Phillips will represent the two metalworking machinery firms.

Faultless Caster Corp., Evansville, Ind., established an office at 1037 E. Parkway S., Memphis, Tenn. Lee C. Barr is the sales representative for the area.

Flexible Tubing Corp., Guilford, Conn., opened a sales and engineering office at 9216 Clayton Rd., St. Louis 24, Mo. F. Richard Krabbe is in charge of the office.

Telecomputing Corp. opened new corporate offices at 9229 Sunset Blvd., Los Angeles, Calif. Whittaker Controls Div. will utilize the facilities at 915 N. Citrus Ave., Los Angeles, for combined production engineering, marketing, and personnel management. The division's manufacturing and assembly has been moved from Lynwood to Van Nuys, Calif., where it will operate in concert with the Whittaker Gyro Div.

56-inch semi-continuous hot strip mill.

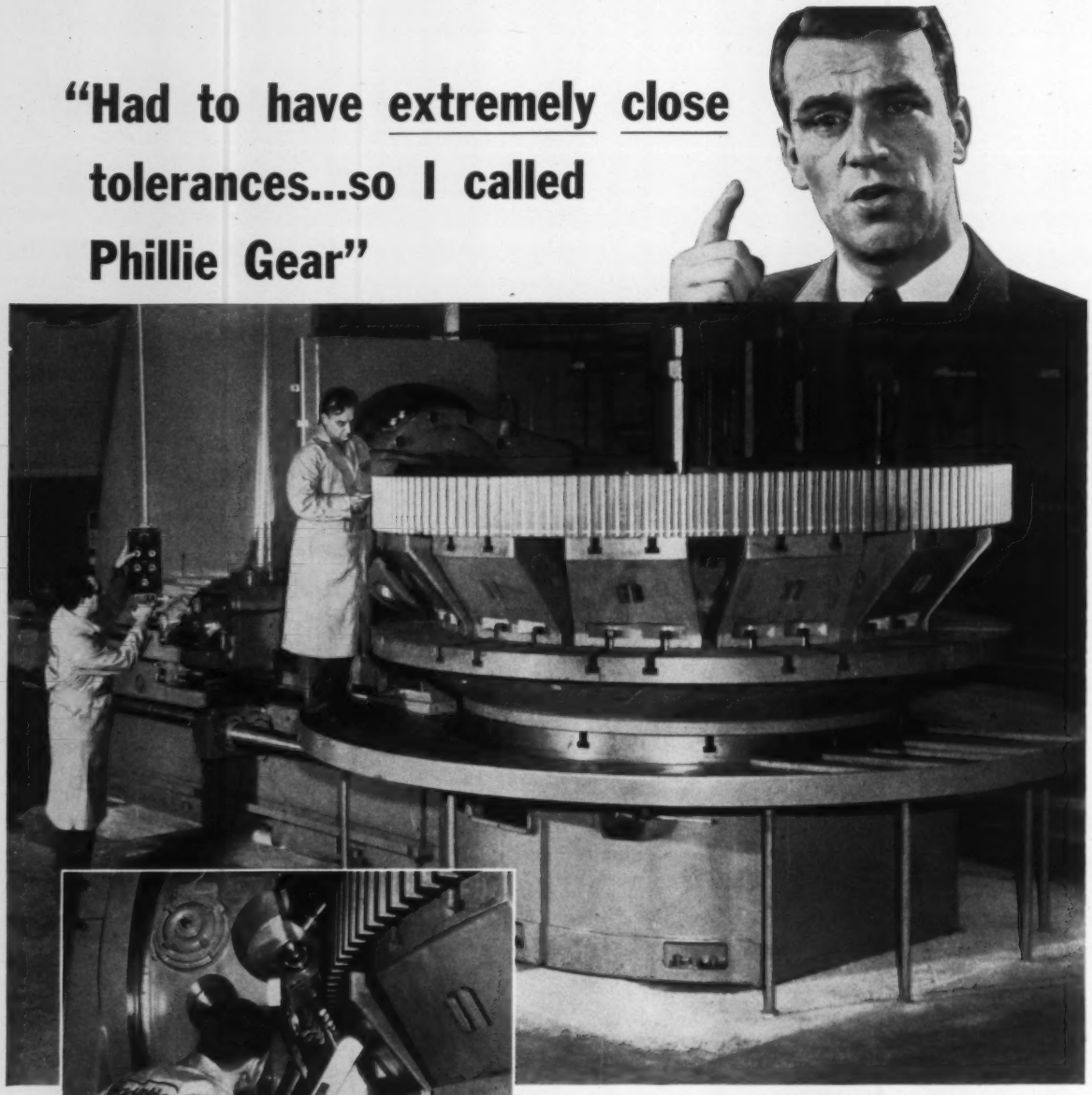
BLAW-KNOX HOT STRIP MILLS

Blaw-Knox designs and builds a full range of continuous, semi-continuous and single stand reversing hot strip mills. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals, sheet and strip processing equipment, electrolytic tinning, annealing and galvanizing lines, seamless pipe and tube mills, draw benches, and cold draw equipment, Blaw-Knox Medart cold finishing equipment, iron, alloy iron and steel rolls, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings. Blaw-Knox Company, Foundry and Mill Machinery Division, Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

BLAW-KNOX

Blaw-Knox designs and manufactures for America's growth industries: METALS: Rolling Mills • Steel Processing Lines • Rolls • Castings • Open Hearth Specialties • PROCESSING: Process Design, Engineering and Plant Construction Services • Process Equipment and Pressure Piping • CONSTRUCTION: Concrete and Bituminous Paving Machines • Concrete Batching Plants and Forms • Gratings • AEROSPACE: Fixed and Steerable Antennas • Radio Telescopes • Towers and Special Structures • POWER: Power Plant Specialties and Valves

"Had to have extremely close tolerances...so I called Phillie Gear"



Phillie Gear's new hobber at work . . . will handle gears up to 165" dia., 64" face width.

Looking for commercial gearing, cut to exceptionally close tolerances . . . at no increase in cost? Then give us a call. We are equipped better than ever before to meet your needs with the highest quality commercial gearing available today.

This new hobber, the latest addition to our new and expanded facilities, is the machine that can turn out the big ones. It is the most rugged, precise gear hobber we've ever seen. It was custom built to our rigid specifications. Accuracy is certified to ten arc seconds.

Whatever your gearing requirement, our engineering staff is ready to work with you in finding a better solution to your gearing problems. And engineering is backed by the newest, most comprehensive production facilities in the industry.

For complete data, write on your company letterhead for our gearing catalog G-127.

phillie gear® / **PHILADELPHIA GEAR CORPORATION**
King of Prussia (Suburban Philadelphia), Pennsylvania

Technical Outlook

IMPROVED LOW ALLOY STEEL— Mellon Institute's (Pittsburgh) new low alloy, Rocoloy 270, has a yield strength of 270,000 psi, ultimate of 320,000, with an elongation minimum of 5 per cent, good fracture toughness and notch strength. A still better Rocoloy, 300, has a yield of more than 300,000 psi and an ultimate above 350,000. It is said to surpass both room and high temperature performance of H-11 type, hot work, die steels. Rocoloy 270 in missiles could reduce dead load 40 per cent. It handles like AISI 4140, says Dr. G. K. Bhat.

AUTOMATED X-RAY ANALYZER— A digital computer linked to an x-ray diffractometer speeds crystal analysis almost six times at Bell Telephone Laboratories, Murray Hill, N. J. The technique, called Pexrad, can orient a crystal to a hundredth of a degree. The computer automatically corrects readings for experimental factors, prints the data for convenience of crystallographers.

COOL PIPELINES— Despite political clouds, Middle East's Kuwait Oil Co. is laying three insulated pipelines, each 2 miles long, to carry liquefied propane (minus 43° F) and butane (20° F) to special tankers for shipment to Japan. Pipelines are made with seamless tube (manganese 1.2 per cent) welded with low hydrogen electrodes. Joints are electrically annealed at the construction site.

PROCESS CONTROL GAINS— Computers have taken over the production of resistors at Winston-Salem, N. C., Works, Western Electric Co. The computer controls automatic assembly as well as quality control. "It is almost impossible for an unacceptable resistor to get through the fabricating machines," the firm states.

MAGNESIUM FOR IRON FOUNDERS— A new method has been developed for injecting magnesium into molten iron for production of gray, ductile, or malleable irons. Advantages claimed: Elimination of porosity or pouring problems with small quantities of metal; silicon content can be raised in carbon levels of 2.2 to 2.4 per cent without fear of mottling, and improved annealing speed and quality. The method permits normal cupola operation to produce high quality, ductile iron in regular plant equipment, claims Jamestown Malleable Iron Div., Jamestown, N. Y., Blackstone Corp.

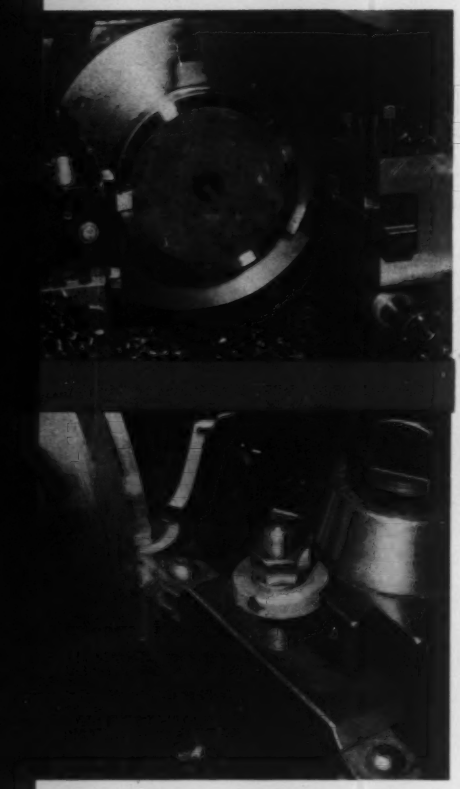
CUT PLASTIC DIE COSTS— By employing aluminum honeycomb in place of plastic laminates, you can substantially reduce the cost of plastic tooling, states Hexcel Products Inc., Berkeley, Calif. Compressive strength of the honeycomb-plastic stiffening varies from 400 to 500 psi.

NEW RHENIUM ALLOY— Commercial production of rhenium-tungsten alloy strip is underway at Chase Brass & Copper Co. Inc., Waterbury, Conn., subsidiary of Kennecott Copper Corp. (The firm also makes a rhenium-molybdenum alloy. See STEEL, May 8, p. 126.) Besides space applications, the firm suggests that it is an ideal alloy for thermocouples in measuring extremely high temperatures.

CAST TUNGSTEN, GET STRIP— Centrifugally cast tungsten can be rolled directly into strip, claims Oregon Metallurgical Corp. (Oremet), Albany, Oreg. The firm starts with vacuum skull-melted metal poured into a revolving graphite mold. As-cast thickness (0.64 in.) is rolled to 0.035 in. at 1832° F without intermediate annealing or recrystallization.

COMMUNICATIONS GIRDLE— More reliable round-the-world telephoning is the object of launching by NASA of perhaps four satellites for AT&T in 1962. The test project is being privately financed. Each satellite will weigh 125 lb and be powered by nickel-cadmium storage batteries and solar cells.

REALLY JUMPIN'— At Radio Corp. of America's Electron Tube Div., Harrison, N. J., tiny Nuvistors must operate while alternating between liquid nitrogen (minus 320° F) and a 660° F electric oven. Among scores of other tests: 0.001 second shocks at 850 g.



Take a New Look At Ceramic Cutting Tools

• WHEN YOU hear someone extolling the performance and potential of ceramic cutting tools, he's probably a production man who has used them before.

Half a dozen years ago, only salesman were enthusiastic about ceramics.

The experience accumulated since then prompts B. J. Naden, sales manager, Vascoloy-Ramet Corp., Waukegan, Ill., to observe: "No other cutting tool material has come so far, so fast."

• A good share of today's enthusiasm for ceramics can be credited to improvements in materials.

When ceramics first came on the market, they were unquestionably overglamorized, oversimplified, and oversold. For example, some said they would replace carbides. Now, no one thinks so.

Many who tried them found ceramics too expensive to be economical, too brittle to be practical, and too inconsistent to be reliable.

That's the era ceramic specialists are still trying to live down. Grant A. Morrison, manager, carbide application engineering, Metallurgical Products Dept., Detroit, General Electric Co., told STEEL: "Our biggest problem today is the bad name ceramics got when they were brought out."

Yet today's records show that the name is being lived down. For one thing, improvements in manufacturing techniques have solved the problem of inconsistency within a grade. Equally important, the strength of ceramics, the material's most publicized shortcoming has been improved. M. S. Day, manager, Stupalox Project, Carborundum Co., Niagara Falls, N. Y., says: "In late 1957, we made a 30 per cent jump in the strength of our ceramic, to about 122,000 psi modulus of rupture, and we're now on the verge of making another jump."

Mr. Naden adds: "We've made tremendous increases in transverse rupture strength, compressive strength, and modulus elasticity, to mention only three of many improvements."

• The benefits you ought to expect from the improved ceramics have been identified and documented.

"To justify the ceramic tool, the operation must be faster and produce a better finish, better tool life, better size control, or allow flexibility of other parts of the job (if it is a part of a multitool setup). Or the operation must allow the turning of parts that could only previously be ground." That's the view of George W. Barnes, product engineer, Refractories Div., Norton Co., Worcester, Mass. (Norton makes the raw blanks for Vascoloy-Ramet.)

An example of each:

• In Kansas City, Mo., a manufacturer bores power cylinders with ceramics at 2450 surface feet per minute. Feed is 0.008 in. per revolution; depth of cut is 0.025 in. Carboloy 0-30 oxide does the job in one-third the time that carbide tools did.

• In Indianapolis, a manufacturer of parts machines a large, welded workpiece (1020 steel) with Vascoloy-Ramet's VR-97 at two to three times the speed he used with carbides. Further, he maintains a surface finish of 25 microinches and has been able to eliminate a finish grinding operation.

• On an automobile engine line in Michigan, five main journals

of cast iron (241 to 277 Brinell) camshaft bearings are semifinished at 370 sfpm with Carborundum's Stupalox. (The carbide speed was 260 sfpm.) The ceramic has a tool life about eight times that of carbide.

• An Eastern steel manufacturer has found that ceramic cutters (VR-97) will finish turn 22 railroad axles, maintaining a tolerance within 0.001 in. Carbide only maintained size within 0.015 in. after turning seven axles.

• A Southern manufacturer of textile machinery turns an 18 in. diameter and bores the 3 in. hole in a cast iron part at the same time. With carbide, the outside diameter was turned at 320 sfpm, but the boring was done at only about 50 sfpm. With a ceramic tool for turning, the outside diameter is cut at 550 sfpm (machine limit), and the boring is done at a more efficient 90 sfpm.

• A bearing manufacturer had to put a chamfer on 60 to 62 Rockwell C races—too hard for most cutters. With ceramic cutting tools, he gets 70 or more parts per cutting edge, and he avoided the expense of an internal grinder.

• Ceramics have the greatest advantage on metals that are hard or abrasive. They are less successful on certain tough, ductile metals like titanium.

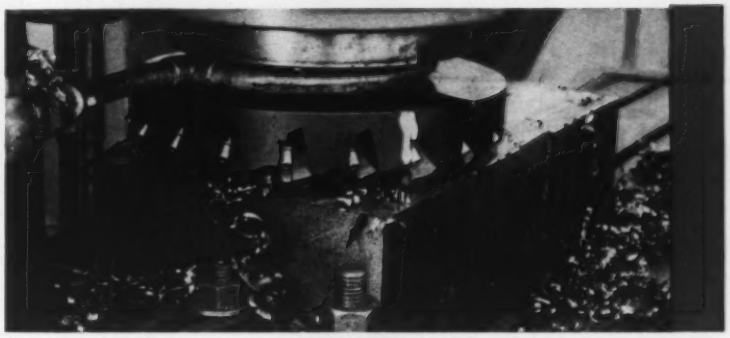
Norton's Mr. Barnes says: "Because of increases in the quality of ceramic tooling during the last two years, it is possible to predict that nearly all finishing operations on cast iron will be improved by the installation of ceramic tooling. Even though the cut may be interrupted, the ceramic tool will perform the operation if conditions are right."

On cast iron finishing, experience has shown that speeds can be raised two to three times over those used with carbides. At the same time, machined surface finishes probably will improve (say 35 to 40 microinches), and the tool life probably will still be better than previous cutting tools could provide.

Roughing on cast iron and similar materials is also a reality. Cuts as deep as ¼ in. have been run regularly, and depths of ½ in. have been reported. Carborundum is trying a 1⅛ in. deep cut on chilled iron—hopes it will lead to a com-

With an insert in every second pocket . . .

Ceramics Can Do Milling



BECAUSE ceramics are supposed to be relatively brittle, they are generally thought of in terms of long, continuous, light cuts that are uninterrupted. They're scarcely ever considered for milling.

Yet at Watervliet Arsenal, where ceramics are the production standard on both rough and finish turning (see Page 130), researchers have shown in tests that they can mill successfully—gains in tool life or productivity have not yet offset the higher tool cost.

The ceramics have milled hardened (400 Brinell) 4340 modified steel with ¼ in. deep cuts at 375 sfpm, and they've produced a finish of about 80 microinches. The feed rate is 5 in. a minute. The speed and surface finish are both better than carbides will do, but the cut depth is less than that of carbide.

Watervliet's Mr. Rodd feels that radical tool geometry (a 53 degree negative rake) is a must to provide adequate support for the cutting edge.

Watervliet's John W. Rodd (left) shows Col. Walter M. Tinsdale, commanding officer, some of the test reports. Mr. Rodd says: "Our test show that milling steel with ceramics is possible. Now, with some more developmental work, we feel the process will be economical on some jobs."

mercial application.

Ceramic specialists are guessing that the largest potential for their material eventually will be in heat treated steel and hard alloys. The machining of steel mill rolls is a good example of what the tools can do (see Page 131). Certainly, ceramic tools have the hardness and heat resistance to machine materials beyond the capability of other tools.

Here's how Vascoloy-Ramet has rated the potential of ceramic tools on a variety of metals:

Excellent: Steel from 30 to 65 Rc, cast iron, tungsten, Stellite, Tantung, copper.

Good: Steel under 30 Rc, 400 series stainless steel, brass, bronze, and cobalt-base high temperature alloys.

Poor: 300 series stainless steel, titanium, aluminum bronze, and iron and nickel-base high temperature alloys.

• So-called normal speed ranges for ceramics will be two to three times as high as those for other tool materials.

That boosts the metal removal rate and spurs machine output. From a productivity standpoint then, Carborundum's Mr. Day says that the ceramics should be most profitable on those jobs where setup time is a relatively small part of cycle time.

On finishing cuts, the speed limits are most often set by the capability of the machine tool speed ranges, or by the shape and balance of the workpiece. But if setup conditions are right, hard steels can be machined over 1000 sfpm; cast iron speeds can be more than 2000 sfpm, (cast iron can be rough cut at 1000 sfpm); and even the cobalt-base high temperature alloys can be cut at up to 700 sfpm with good tool life and good surface finishes on the work.

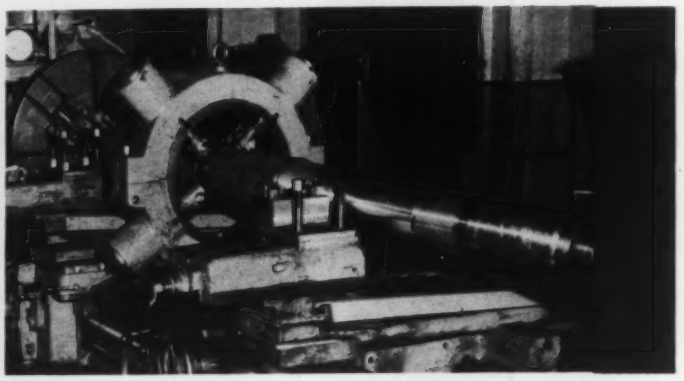
It's probably true that many machine tools in use are not sufficiently rigid or fast enough to push ceramic cutting tools to their limits. And yet GE's Mr. Morrison says: "Sufficient speed, horsepower, and rigidity are available on the majority of equipment to permit machining of medium and high tensile materials with cemented oxides at 2 or 3 times the speed of cemented carbides. As hardness and tensile strength of the steel increase, cutting speeds used with oxides must be reduced to obtain economical tool life."

• Milling with ceramics is on the horizon.

Tests at Watervliet (Page 129) show that ceramic milling on steel can be done. The makers of ceramic cutting tools are continuing to run milling tests, and they have no doubt that production mill-

Three ceramic successes — on . . .

Gun Tubes



ONE OF the first and still most successful applications for ceramic cutting tools was at Watervliet Arsenal, Watervliet, N. Y. The job: Turning gun tubes for 105 and 120 mm tank guns.

The rough, 180,000 psi tensile, modified 4340 steel forgings are up to 22 ft long (120 mm gun) and vary in diameter from 8 to 11⅝ in. The steel is hardened and drawn to 34 to 42 Rockwell C, with occasional hard spots of 45 to 48 Rc.

Depth of cut varies in any one cut from ¼ to ⅝ in. because of the eccentric distribution of the rough stock. The problem of varying cutter load, one that would cause some engineers to rule out ceramics, was solved, partly by the use of a 0.0015 in. thick aluminum foil shim cushion under the ceramic.

Figured on the production of 100 gun tubes and average operations (0.3 in. depth of cut, 420 sfpm, 0.022 in. feed), ceramics travel about 174 in. before the edge is changed. Carbides run at the same cut depth and feed rate but at only 175 sfpm give about the same life per cutting edge.

The significant difference: Ceramics remove 31.5 cu in. of metal a minute, carbides only 14 cu in. Also, with carbides, the machining of 100 tubes takes 178 hours ($10 an hour) and costs $2080, including a $300 tool cost. With ceramics, the job takes 79.3 hours, costs $1173, including a $380 tool cost.

The savings: 56 per cent in production time; 44 per cent in tool and labor costs.

With those savings proved over long production runs, ceramics have established themselves as standard tooling for the job at Watervliet. The inserts are 3/4 in. square, ¼ in. thick. The nose radius is held to 1/16 in. or less to keep chatter at a minimum.

Brake Drums

SIXTY per cent of the automotive brake drums turned out at Kelsey-Hayes Co., Detroit, are machined with ceramic cutters. And that percentage is fairly typical of today's brake drum business.

Watson Halon, plant manager, says that the ceramics are run at higher speeds than carbides, and that, even with the increase in speed, the ceramics last nearly twice as long as the carbides.

Ceramics are run on the cast iron parts at 1200 to 1300 sfpm, with a feed rate of 0.011 in. per revolution. Carbides run at 500 sfpm.

Mr. Halon says the ceramics turn out about 40 drums per cutting edge (eight edges to an insert). Brazed carbide cutters produce about 25 drums per grind.

The ceramic inserts are ½ in. square, 3/16 in. thick. They have a 1/16 in. radius and are used with 6½ degree negative side and back rake angles.

The inserts are changed at the first sign that drum tolerances won't be held. Mr. Halon says that breakage of inserts has not been a problem.

Like other producers of brake drums, Kelsey-Hayes uses the ceramics whenever it can. The surface finish produced is good enough to make honing unnecessary. That smoothness is an objection, however, to some customers and where the rougher surface is specified by the customer, carbides are used.

Mill Rolls

NEARLY every major manufacturer of mill rolls has tried ceramic cutting tools for turning the hardened products.

At Midvale-Heppenstall Co., Philadelphia, for example, ceramic inserts are the standard for finish boring hardened roll sleeves and for boring any cylinder requiring a line bore. In addition, ceramics are standard finishing tools on hardened steel mill rolls.

Charles R. Gordon, general superintendent of the machine shops, says that the rolls used to be rough turned, leaving about 1/32 in. of stock on the diameter and 1/16 to ⅛ in. on the length. Then they were heat treated. Finally, the hardened rolls (about 71 to 72 Rockwell C) were finish ground.

Now the hardened rolls are finish turned with ½ in. square ceramic inserts, an added operation. Cut depth is normally about 0.030 in.; feed is 0.005 to 0.007 in. per revolution; and the speed is about 200 sfpm, varying some with hardness. Only about 0.005 in. is left for grinding.

Mr. Gordon says: "The use of ceramics has permitted a substantial reduction in the cost of grinding wheels. We eliminated the possibility of spalling on the ends of the rolls due to heat checks from excessive grinding pressures. And we placed ourselves in the position of cutting our over-all machining time by 20 to 30 per cent."

---

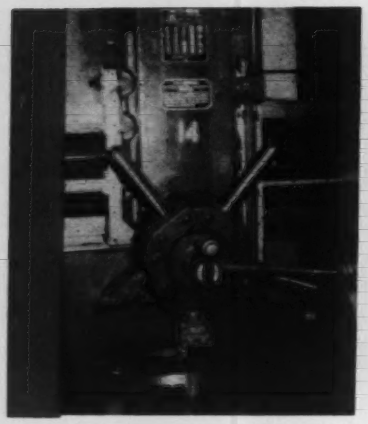
ing will be done economically.

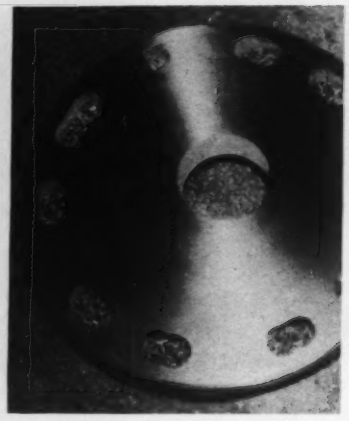
Ceramic milling on cast iron is a reality. In at least one plant in England (Alvis Ltd., Coventry), the problems of intermittent load have been solved, and ceramic insert milling cutters are being used in production. The parts include a cast iron, 6 cylinder engine block (a severe interrupted cut), bearing caps, and cast cylinder heads. Speeds are 310 to 900 sfpm; feeds range from 3 to 5 in. a minute; and cut depths are as much as ¼ in. The ceramic (Carborundum Ltd.) has reduced time and tooling costs.

• **Generally, tools will have to be**

Solved:

An Interrupted Cut





BECAUSE the edge strength of ceramic tools is less than that of other cutting tool materials, the shock of an interrupted cut is almost always regarded as fatal.

But at Fuller Co., Manheim, Pa., ceramic inserts are finish facing gray iron cylinder heads via interrupted cuts. The work is done on a 36 in., Bullard, vertical turret lathe.

The part has an 18 in. OD. Ceramics run at 1418 sfpm on the outside diameter (210 sfpm at the end of the cut), with a feed of 0.010 in. per revolution. With a 0.010 in. deep cut, the job is done in 2.4 minutes; 100 cuts can be made with one cutting edge.

With carbides, the speed at the outside diameter was 316 sfpm; feed was 0.015 in. per revolution. It took 7.71 minutes to face a part, and tool life was 12 parts per cutting edge.

The ceramic insert (Carborundum's Stupalox) is set at 5 degree negative side and back rake.

huskier than carbides need be; geometry will be aimed at maximum edge support; and tool maintenance must be good.

Carborundum says that most (perhaps 90 per cent) of its ceramic applications are tools that have negative rakes; 5 to 7 degree negative rakes are common, but on the hard materials, negative rakes to 30 degrees are recommended. Use them on all the high strength materials, on all steels, cast iron, and most nonferrous metals. Soft aluminum alloys can be cut with 0 degree rake angles. Positive rakes will work on the soft metals.

Most experts are recommending the use of lead angles, especially when machining hard metals. The lead angle produces a thinner chip for a given feed rate by spreading the chip over more of the cutting edge. It lightens the chip load on the tool, and reduces the shock given the tool when it enters the cut.

Also, a so-called edge land (a chamfer along the cutting edge) is effective, particularly on roughing cuts on cast iron or roughing or finishing cuts on high strength materials. Developed at Ohio State University, the edge land should have a width equal to about half the feed and should be at an angle of about 30 degrees from the tool's top surface. Norton has said that it is nearly impossible to machine hardened steels without first honing the edge of the tool thoroughly to create an edge land.

Nearly all ceramic applications are with disposable inserts. The holders must be rugged and in good shape (no burrs or otherwise damaged seats). Carbide seats are recommended, and on heavy cuts, an aluminum foil shim has given good results (as in turning gun tubes, Page 130).

For those jobs where disposable holders won't work (small hole boring, for example) single point tools are available in which the ceramic tip is adhesive bonded to the shank. Those tools can be reground like carbides, with resinoid bonded diamond wheels.

• The sales trend of ceramic inserts indicates their increasingly solid position on the production line.

Figures on ceramic sales are hard to come by, but here's an educated guess:

1955	†
1956	$50,000
1957	$100,000
1958	$100,000
1959	$250,000
1960	$500,000

†Limited commercial volume.

One manufacturer figures that the long range potential will be as much as $15 million to $18 million.

• And the future looks even brighter, say the experts.

Dominick T. Bisceglia, section chief, Watervliet Arsenal, says: "It is the attitude of expecting miracles that has led to so many misconceptions about ceramics. They cannot be indiscriminately interchanged with other cutting media, although they may outperform any other known media both in volume and scope in select situations. With that word of caution we may look forward to an era of growing use of ceramic. Barring a monumental breakthrough in carbides, and that does not appear imminent, we confidently expect that ceramics will establish production rates unattainable by current tooling."

Other experts echo Mr. Bisceglia's views. You can't slip in ceramics on an existing job. The job has to be studied. But on more and more jobs, the study and the change will pay off.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

Nylon Parts Get Bigger, Cheaper

Polymer Corp.'s new casting process employs monomer raw material . . .

• LOOK FOR increasing competition from nylon cast into large industrial shapes via a process introduced by Polymer Corp., New York.

"Monomer (MC) nylon casting is similar in technique and costs to conventional metal casting," states Louis L. Scott, president. He lists these advantages:

- Raw material (monomer) costs half as much as conventional nylon.
- Casting size is unlimited in the "large" category.
- Tooling and mold costs are low.
- Physical properties are equal to or better than those of other nylons.
- Physical properties can be tailored to fit your needs.

• MC castings cost less per piece than stainless or brass and compete favorably with alloy steels. Expected improvements will cut present costs in half, making such castings competitive with carbon steel and aluminum, states Polymer Corp.

Production of raw monomer nylon bypasses several steps needed for conventional nylon polymers. Result: Monomer costs 46 cents per pound, polymer 98 cents.

In working with polymers, pressures of 100 to 20,000 psi run up machinery and tooling requirements. MC nylons are cast without pressure. The material melts at 150° F, then polymerizes as it fills the mold. No gases are formed, a feature that permits unlimited size.

Injection mold costs for a 7 lb part may run $5000; those for MC castings are $100 to $500, states Polymer Corp.

In a similar example cited by the firm, extrusion tooling for 8 in. rods runs about $1500 vs. mold costs for the same rod 4 ft long of $100.

• Monomer casting has some limitations: Parts can't be too small; low costs depend on mass production, and careful manipulation is required.

Polymer's president (left) checks nylon ring gear 4½ ft in diameter

It is still simpler and cheaper to injection mold small parts that require cycles up to 30 seconds. A comparable monomer casting would require perhaps 5 minutes.

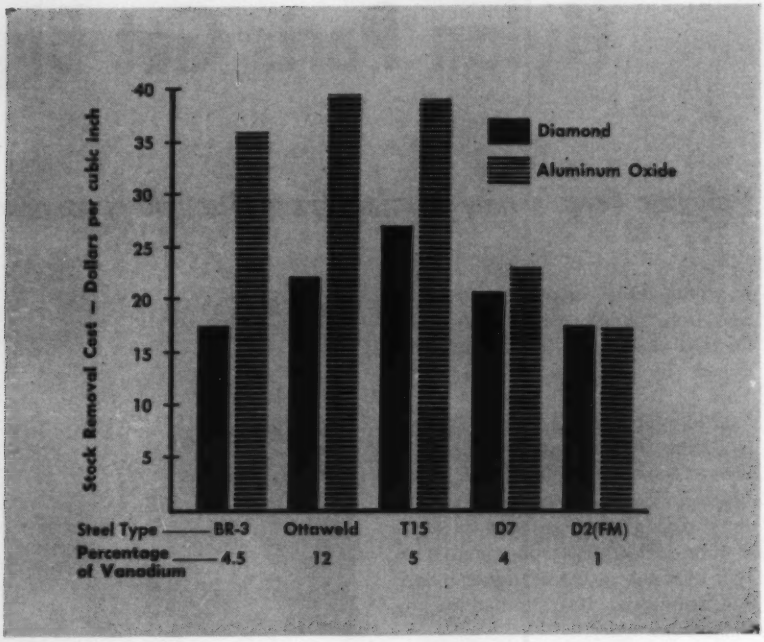
MC casting greatly simplifies the production of large nylon parts. But production techniques must be timed and controlled exactly. Chemical controls are employed, and temperature regulation is critical. Entirely new production methods often must be developed to realize consistent results and low scrap rates.

Even so, the techniques generally resemble those employed in metal casting, Polymer Corp. says.

Largest parts made so far have been under 700 lb (a steel casting the same size would weigh 2 tons).

The firm is looking for metalworking markets, including railway, mining, construction, and material handling equipment and papermaking machinery.

Polymer Corp. is the exclusive licensee of Monsanto Chemical Co., St. Louis, which has filed the basic patents on the process.



Comparison of grinding costs (right) for several high vanadium alloys . . .

Diamond Wheels Cut Tool Grinding Costs

• MORE AND MORE shops are turning to manmade diamond wheels for grinding tool and die steels, claims the Metallurgical Products Dept., Detroit, General Electric Co.

Reasons: In handling high vanadium, high speed die steels, shops are showing cost savings up to 50 per cent; stock removal is 50 per cent faster; operators are finding it easier to get precise dimensions.

In the softer tool steels, gains in holding dimensional accuracy and flatness may favor the use of a slow wearing diamond wheel even though costs are the same as those of more conventional wheels.

• Users of high vanadium (3 per cent plus) tool steels often have found it difficult to grind to good tolerances at reasonable rates with conventional wheels.

Vanadium carbide in such steels provides superior wear resistance, but it creates grinding problems which diamond wheels can overcome, says GE.

The cost of grinding with a manmade diamond wheel is competitive with that of an aluminum oxide wheel, GE finds. Since the wheel cost ratio is 150 to 1, it has prepared data to confirm its contention. Results have been checked and confirmed in the field.

Tests indicate a lower total cost for diamond grinding the BR-3, Ottawa 60, and AISI grades T-15, M-4, D-7, and M-3. (D-2 and M-7 are borderline cases, says GE.) Diamond grinding gets more economical as vanadium content reaches 4 per cent or greater. The same pattern fits the molybdenum base, high speed types — improvements are noted at 3.2 per cent levels and up. Exception: The tungsten base, high speed steels. GE attributes that to the somewhat smaller vanadium carbide volume in that steel system. Closer definition of those variables is expected to result from exploration of the interrelationships between carbide particle size and volume and grinding characteristics.

In addition to total cost per cubic inch of steel, GE compared diamond wheel characteristics with those of aluminum oxides. Its evaluations: Diamond grinding ratio (metal removed vs. wheel wear) on BR-3 is 250 times greater, on M-2 only five times; rate of cut on an average is twice as great for diamond than for aluminum oxide; diamond wheel wear on many steels was insignificant; surface finish generally was about comparable with both wheel types. GE also observes that the relative performance of the diamond wheel generally improves with the larger workpieces primarily because the stock removal rate of an aluminum oxide wheel deteriorates with increasing block size.

• Tests were run with a 100 grit vitrified diamond wheel 7 in. in diameter and a 60 grit semifriable aluminum oxide type. Both were ½ in. wide.

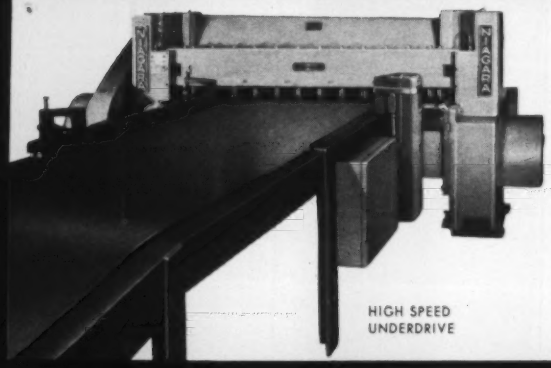
The aluminum oxide wheel was selected for comparison because of its popularity. A 6 in. by 1 in. test block was surfaced longitudinally on a 6 in. by 18 in. horizontal spindle surface grinder. An emulsion of soluble oil was the coolant.

Other test conditions include: Wheel speed, 6000 sfpm; table speed, 60 fpm; downfeed, 0.001 in. crossfeed, 0.050 in. per pass.

Wheel wear and stock removal were measured with a micrometer after each test.

UNDERDRIVE

GAP TYPE



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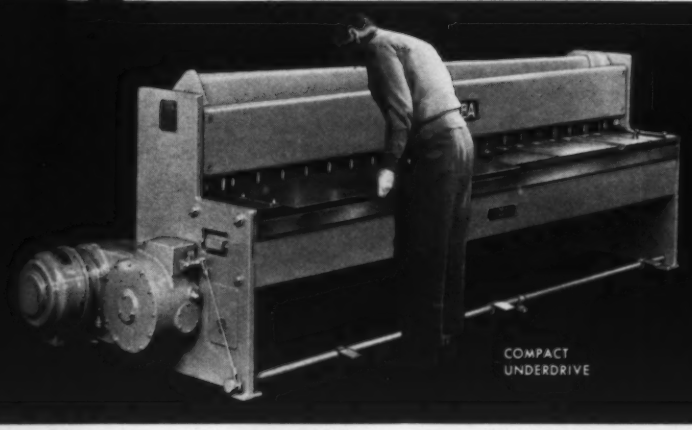

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Galvanizing Line Coats 72 in. Strip

Armco's newest zinc coating line has a rated output of 30 tons per hour

● "AVAILABILITY of galvanized sheets and coils in widths up to 72 in. should stimulate greater use of zinc coated steel in many markets," says Clyde G. Davies, vice president and general manager, Armco Div., Armco Steel Corp. Coating capacity at the division's Middletown (Ohio) works has been more than doubled with the completion of a 72 in., continuous processing line (see STEEL, July 31, p. 92).

The new, $8.5 million line, which has a rated output of 30 tons per hour, was built by Wean Engineering Co. Inc., Warren, Ohio.

● **Processing of wider strip cuts down on design problems for the fabricator. It also reduces coating costs.**

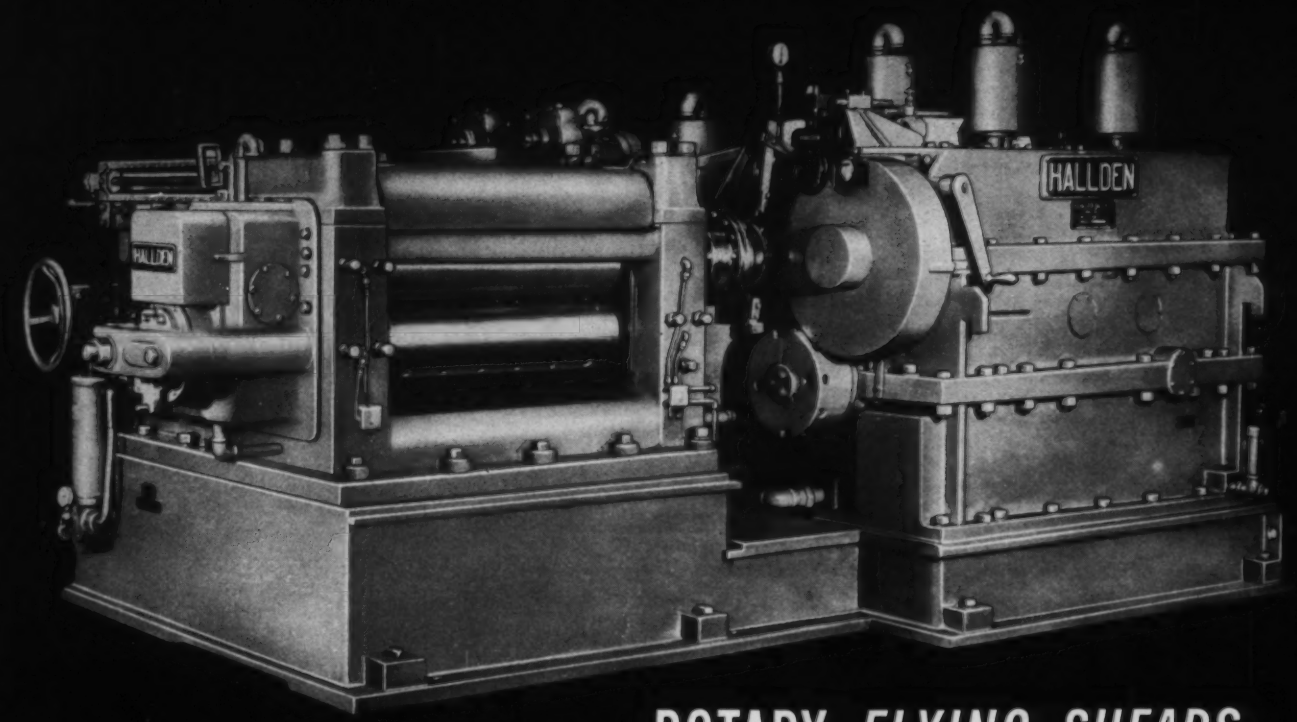
"The user of galvanized steel can do a more economical job of designing his product with wider sheets," says Logan T. Johnston, Armco president. "For example, the need for fewer laps or welds reduces labor and material costs in fabrication.

"The producer also benefits by the width increase. The 72 in. line processes wide coils, available from the Middletown mills, and turns out a product that can be slit and used by fabricators in 36 in. coils (or in other widths). That helps hold down coating costs and insures more stable strip prices for the customer."

● **Efficient processing equipment provides uninterrupted flow of sheets and coils from the line.**

The new line requires about the same amount of floor space as the two older Middletown coating facilities. The system of oxidizing, reducing, and heat treating furnaces, supplied by Electric Furnace Co., Salem, Ohio, includes more powerful heating and cooling equipment, in a more compact arrangement.

Steady flow of strip is insured by



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Wider coils reduce costs for the producer and fabricator of galvanized strip

two payoff reels, a Taylor-Winfield end welder, and almost 200 ft of strip storage in the entry loop. Similar storage is available at the exit end of the line.

The Wean coating rig employs heat from incoming strip to hold the zinc melt at proper temperature. (Electric induction heat is used only for startup.) Minimum dross is generated in the melt because the shell of the pot isn't constantly subjected to severe heat.

Floor mounting of the main drive pinch rolls makes maintenance less difficult.

Much of the coated product is shipped in coils, but sheets are produced and processed effectively by a Hallden shear, two Voss levelers, and a Bucciconi, magnetic stacker. The product is available in coils up to 50,000 lb, or in sheets 5 to 20 ft long.

• New applications and increased tonnages in standard use areas are expected to promote market growth for galvanized material.

"Completion of the 72 in. line reflects our confidence that the galvanized steel market has a sound base," says Mr. Johnston, "and it gives us the capacity to meet the growth we anticipate in demand for zinc coated products.

"Shipments of zinc coated steel (reported by the American Iron & Steel Institute) were slightly more than 3 million tons in 1960, a record high. Industry estimates of 1961 shipments run as high as 3.3 million tons.

"The record tonnage of galvanized products in 1960 takes on increased significance because of the generally lower operating rates. A steady and impressive growth trend is evident. Zinc coated tonnage has almost doubled since the early postwar years, while over-all steel production has grown 66 per cent. Product innovations and improvements have been largely responsible for that success."

• Improved surfaces, for better paintability and fabricability, should help promote still greater market growth.

Differential coatings provide standard coating on one side for full corrosion resistance and minimum coating on the other side for optimum paint adherence. Such material is desirable in many applications, including automobile rocker panels.

Spanglefree, chemically treated surfaces offer maximum corrosion protection and good paintability. Those materials should be used widely in automotive, appliance, and architectural applications.

Minimum spangle materials will be available to satisfy surface requirements between those of standard coated and spanglefree surfaces.

New Mill at Algoma Makes Bigger Beams

WIDE FLANGE beams in sizes up to 12 by 24 in. (190 lb per foot) are being rolled on a new, $15 million, parallel flange beam mill at the Sault Ste. Marie (Ont.) Works of Algoma Steel Corp. Ltd.

The largest structural shape offered previously by Algoma was a 6 by 18 in. I-beam that weighed about 55 lb per foot.

• Latest Expansion Project — The mill, which was supplied by Dominion Engineering Works Ltd., Montreal, Que., subsidiary of Dominion Bridge Co. Ltd., is the latest phase of a $185 million modernization and diversification program. Algoma's annual ingot capacity has been boosted to 1.6 million tons, from 866,000 tons in 1950.

The installation emphasizes the company's potential role in the Canadian development picture. It is capable of producing wide shapes that were previously imported at the rate of 200,000 tons annually (about $28 million worth).

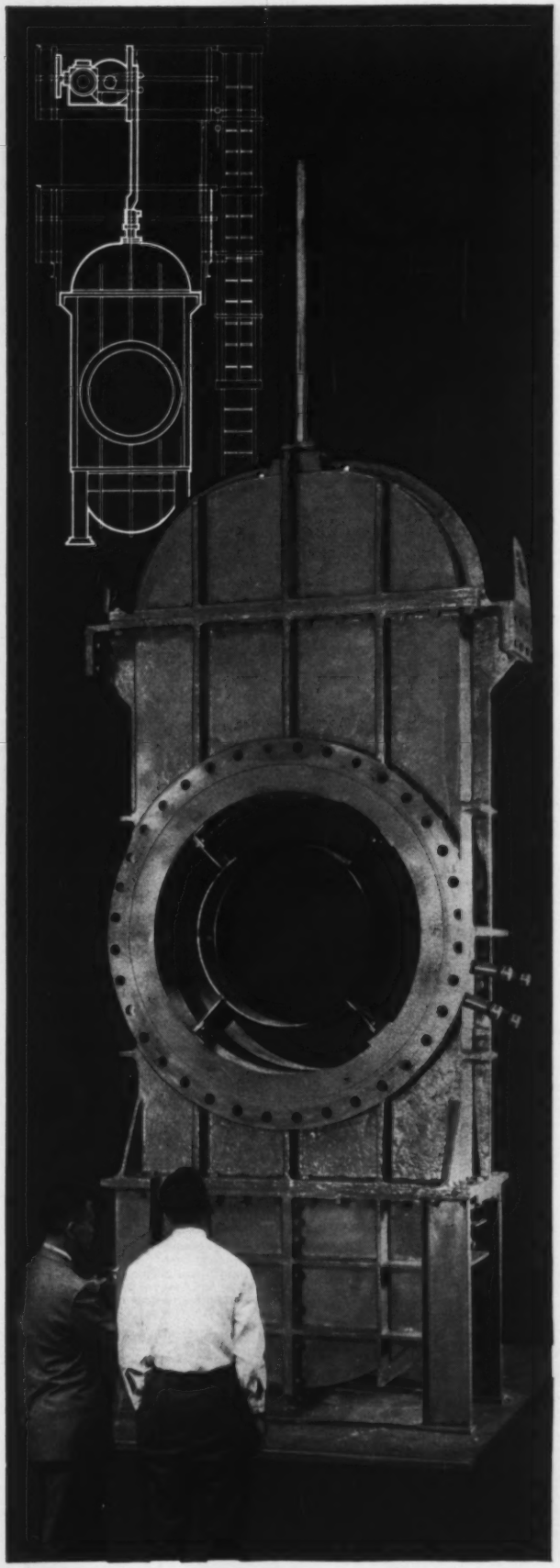
Construction work didn't seriously reduce the output of adjoining mills, where operations are integrated with those of the new facility.

• Universal Mill—The facility consists of a 50 in., universal roughing mill and a 36 in. edging mill in tandem, and a 50 in., universal finishing mill.

The mill is designed to operate alternately with a rail and structural mill. The two mills are served by the same continuous, reheating furnace and a 32 in. breakdown mill.

• Untapered Flanges — Rolling of beams in a universal mill, with plain rolls working the steel in horizontal and vertical positions, produces wide, untapered flanges, which are said to carry loads more efficiently than standard structurals. The wide flange structurals are used in large buildings, bridges, and other major construction projects.

Standard beams are rolled on conventional structural mills, which have horizontal, grooved rolls. Result: Narrower flanges, with considerable slope, or taper.



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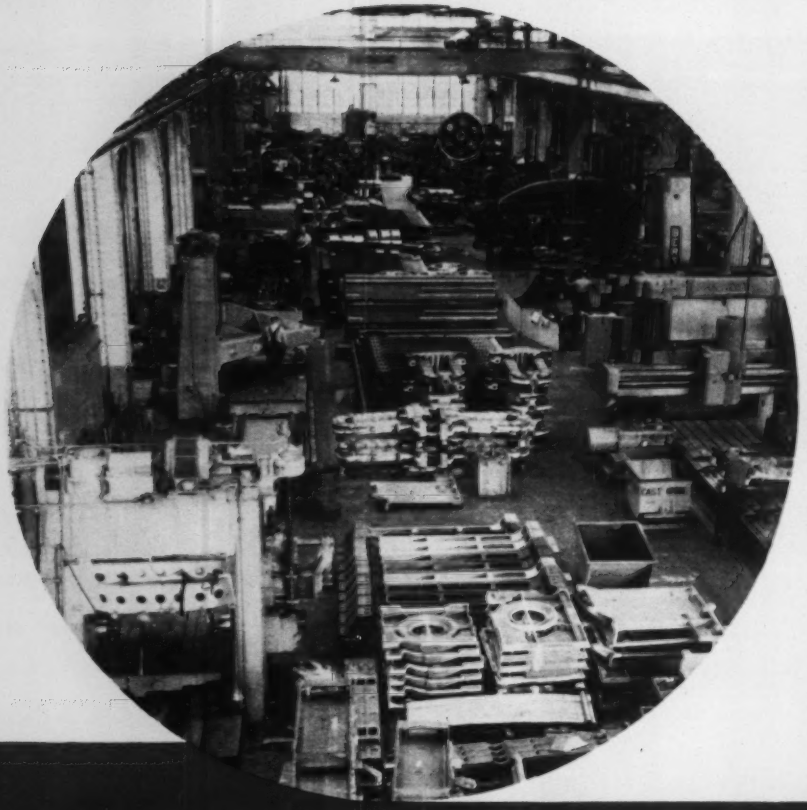

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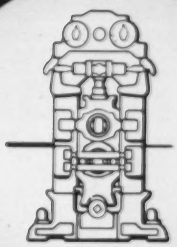
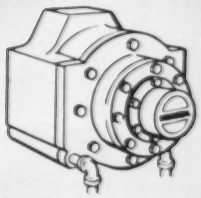


ROLLING MILLS



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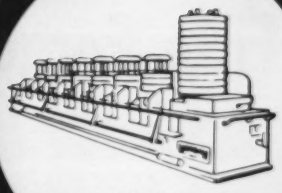
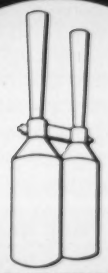


WIRE DRAWING MACHINES

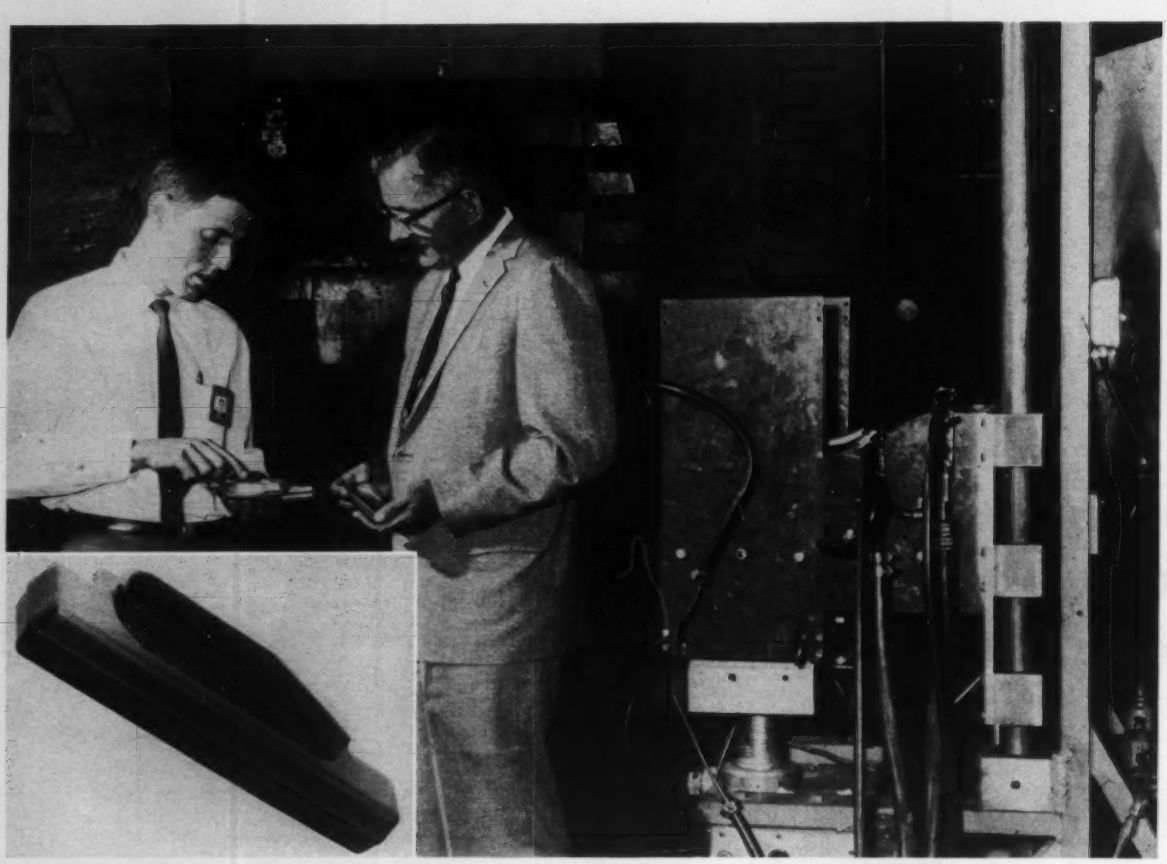


COMBUSTION CONTROL

MORGAN CONSTRUCTION CO.
WORCESTER, MASSACHUSETTS

THE KEY NAME FOR PROGRESS IN STEEL-PROCESSING EQUIPMENT

CS3 © MORGAN CONST. CO. 1961



Test piece (inset) was heated in vacuum-argon furnace (right) as . . .

Firm Forges Solid Tungsten Shapes

• **PURE TUNGSTEN has been forged into thin sections at the Tapco Div., Thompson Ramo Wooldridge Inc., Cleveland.**

Results: Web and rib thicknesses of 0.130 in.; tolerances of plus or minus 0.015 in.; surface finish of 30 rms; draft angles of 1 degree.

The significance, say Tapco officials, is that tungsten ingot producers now have an incentive to make wrought starting stock for forgings.

• **The Tapco technique is expected to aid other suppliers of tungsten forgings. The firm designed much of the equipment.**

Tapco had to extrude tungsten alloy ingots to get the bar stock for its experiments. A 700 ton press was employed to form ingots heated to 4000° F in argon.

Available commercial equipment that generates such temperatures contaminates the ingot, claims Tapco. The furnace it designed can be evacuated to 10^{-6} mm of mercury and purged with argon to protect the ingot during heating. Unusual extrusion die lubricants were employed to keep the 4000° F ingots from melting die surfaces.

Forging took three steps. Careful control of metal flow patterns, temperatures, and lubricants enabled commercial die steels to withstand repeated blows in a National Maxipress.

Ingots, extruded bar stock, and finished forgings were given ultrasonic inspections, chemical analyses, and a number of mechanical tests. Properties: Tensile strength, 38,200 psi at 3000° F; and a stress rupture life of 32.5 hours at 15,000 psi.

The work is being done under an Air Force contract for prototype quantities of parts for missile and space vehicles.

Tapco officials say the work was done three months earlier than estimated.

If the J & L turret lathe insert is missing, write JONES & LAMSON, 517 Clinton St., Springfield, Vermont, for your copy.

Tear it out for your files

Highlights from today's most progressive line of cost-cutting turret lathes and optical comparators . . .

Like all J & L machines and equipment, the products shown on the following pages are available through J & L's "Profitivity" leasing arrangements. No down payment or deposit is required. An hourly rate of $2.50 per $20,000 machine value puts J & L **profitable** productivity into your plant. Send coupon below for complete information.

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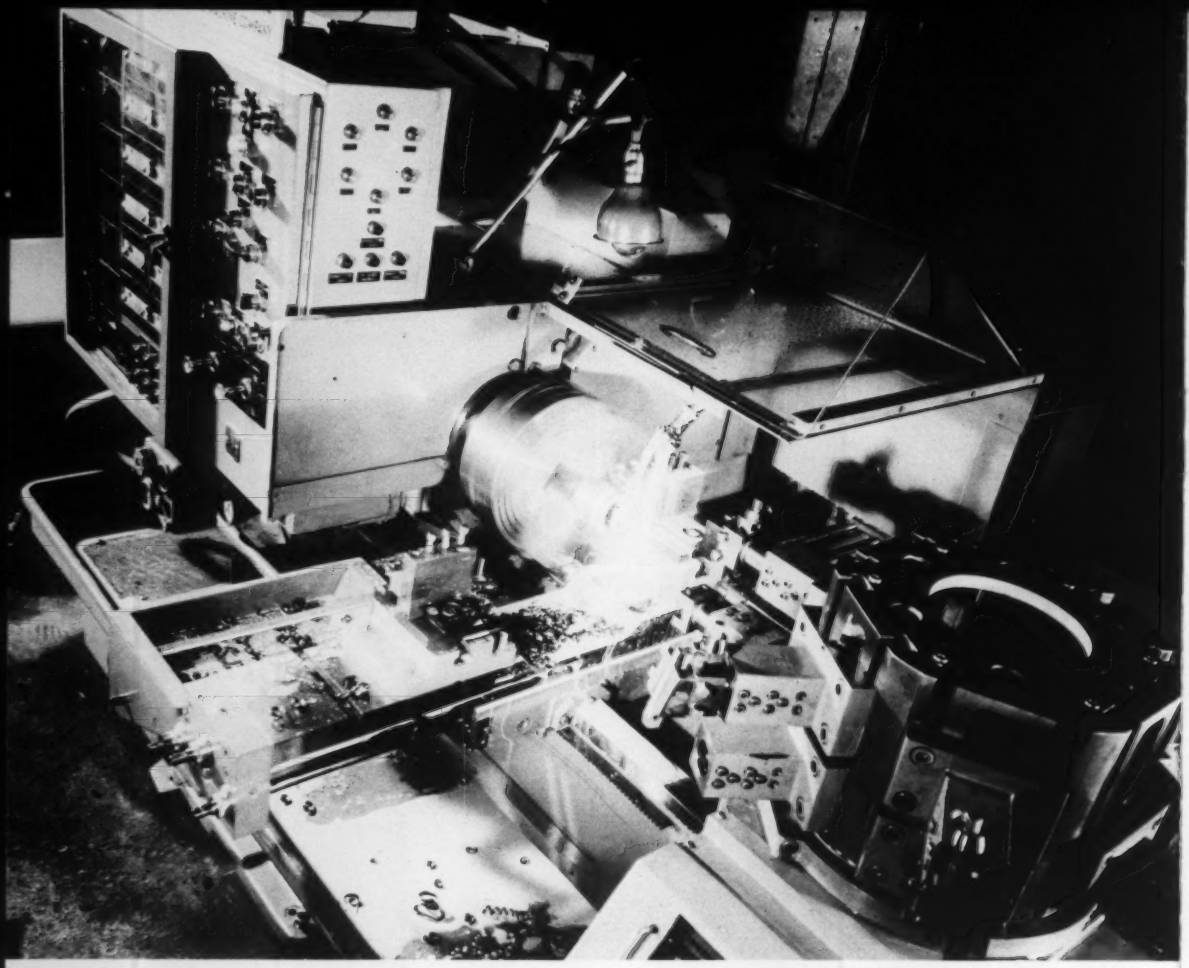


NEW ATL AUTOMATIC TURRET LATHE

Push Button Programming. Fast, Snappy Machine Action. Rugged Capacities for Both Bar and Chuck Work.

This new turret lathe is specifically designed to package the maximum benefits of automatic turret lathe operation. For instance, it has the rugged capacities of a solid saddle type turret lathe (no ram overhang). Combined with this rigidity is extremely fast, positive machine action (rapid traverse of the saddle is 500″ per minute and turret indexing, fully tooled, is less than 7 seconds through all six stations).

Machine programming is simple and versatile. The staging panel, conveniently mounted on the machine, consists of clearly labeled push button controls and selector dials for motion sequences, speeds, and feeds.

The ATL is a single package machine design. All components including controls, motors, hydraulics, coolant and electrical circuits are assembled into a compact machine unit; completely interconnected in all respects and ready for shipment, or moving.

The ATL provides up to 40 H.P. for either a 12- or 24-speed automatic headstock. Speed ranges are available with a maximum speed of 2000 RPM. Fifteen feeds are provided for both saddle and cross-slide, with a maximum of 15″ per minute on the cross-slide and 30″ per minute on the saddle.

The high hexagon turret provides added tooling versatility and simplified tool setting. This turret is used primarily for chuck work although the machine itself is easily converted for either chuck or bar work.

The ATL has rigidity to spare. It has hardened-and-ground steel bedways, a full 14½″ stroke on the cross-slide with positive stops, and all other design refinements associated with the accuracy and dependability of Jones & Lamson turret lathes.

CONTROLS and How to Use Them

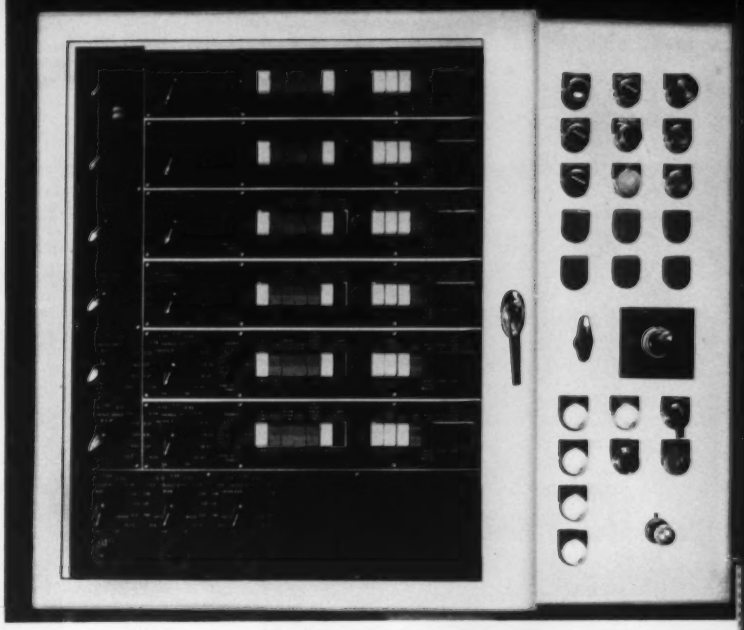
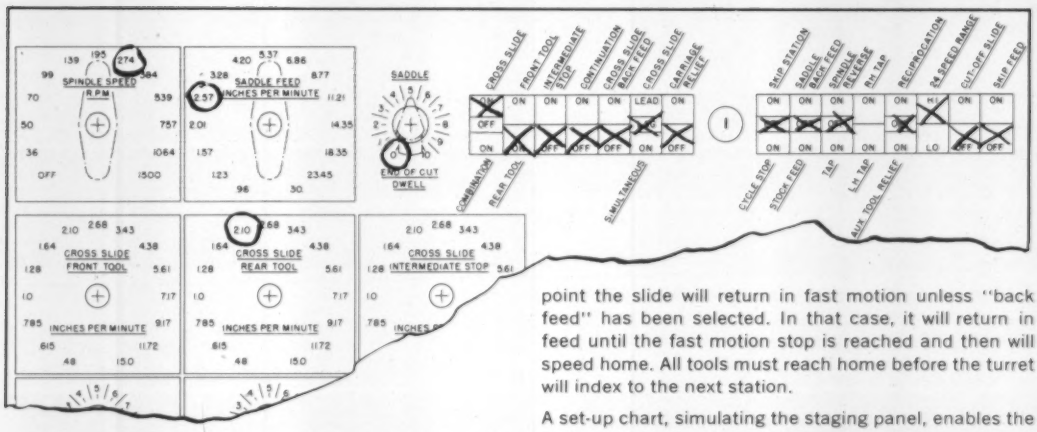


FIG. 1



The ATL may be programmed for completely automatic operation of a variety of machining cycle sequences. These include: bar-feed advance, collet "close" and "open", turret index, rapid traverse for cross-slide and saddle, back-feed, cross-slide lag, cross-slide lead, continuation, intermediate stop, combination cross-slide and saddle, spindle reverse, independent feed rate for each turret face, independent feed rate for front and rear of cross-slide, independent spindle speed for each turret face, independent dwell for front or rear of cross-slide and each turret face.

The cycle chosen can be either manual or automatic. It may be set for a single cycle or to repeat for multiple automatic cycles.

In addition, controls are available to manually traverse the saddle forward and reverse (joy stick); manually traverse the cross-slide in and out (joy stick); to manually engage the spindle in forward, reverse, jog or free position; and to open and close power chucks.

All of this programming is performed through a single staging panel. Clearly labeled push buttons and selector dials enable the operator to select a variety of cycle motions from each hexagon turret position. Dials provide individual, speed, feed and dwell selection for each tooling station. Tool carrying members are always in fast motion until the fast motion stop is engaged. They then automatically go in to feed. When the tool reaches end point the slide will return in fast motion unless "back feed" has been selected. In that case, it will return in feed until the fast motion stop is reached and then will speed home. All tools must reach home before the turret will index to the next station.

A set-up chart, simulating the staging panel, enables the operator to program machining sequences in a matter of minutes. Speeds, feeds and dwell are shown for each tooling position. The selection of push button positions is also indicated for each station so that the proper automatic machining sequence may be obtained.

Fig. 1 is a section of the set-up chart which illustrates an example of programming instructions for a turret position. Spindle speed dial is set at "274". Saddle feed dial is set at "2.57". Saddle dwell is set at "0". Rear cross-slide feed is set at "2.10". Cross-slide dwell at "0". The push button for cross-slide is set at "on". Cross-slide is set for "rear tool". Intermediate stop is "off". Continuation is "off". Back feed is "off". Cross-slide is set at "lag". Carriage relief is "off". All other buttons for this station are set at "off".

These selections mean that the cycle will start with a spindle speed of 274 RPM. The saddle will advance in fast motion to a knock-off stop. It will then go into 2.57"/-min. feed. When this tool (mounted on the face of the hex turret) reaches its end point, the saddle will return to home in fast motion (500"/min.). The rear tool slide will then advance in fast motion (250"/min.) to a knock-off stop and go into a feed of 2.10" per min. When this tooling reaches end point, the rear slide will return to home in fast motion. All tooling positions now being back home, the turret will index in approximately one second and the machine will proceed to follow instructions from the next selected turret position. And so on through the cycle.

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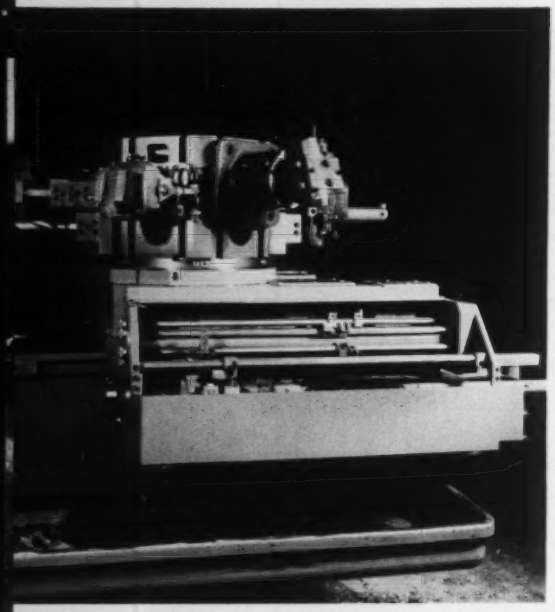
NEW ATL AUTOMATIC TURRET LATHE



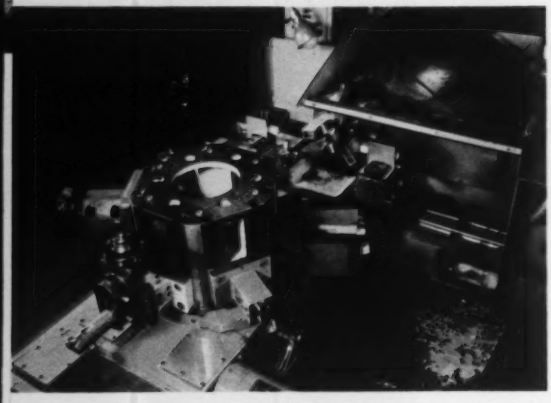
24″ saddle motion provides maximum length of turn . . . maximum rigidity

The 24″ saddle motion is actuated by a closed-loop, two-level, hydraulic servo system. A variable speed, reversible DC motor is used as a velocity reference in the speed feed range. Rapid traverse of 500″ per minute is obtained hydraulically.

The Geneva indexing mechanism allows the turret to be indexed very rapidly (approx. 1 sec.) anywhere along the bedways. Saddle travel is not necessary to index the turret.

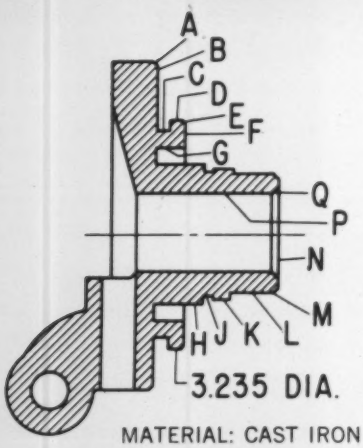
End point control for each tooling station of the saddle is by manually set stops on a 6-sided reel that is geared in synchronism with the hexagon turret.

HIGH HEXAGON TURRET FOR EXTRA TOOLING VERSATILITY



The high hexagon turret is designed for simplified setup of extra tooling at each turret position. Multiple tooling is accomplished by setting a second flange tool holder above the one which is in line with the spindle axis. A variety of cutter holders may then be simply set to accomplish a diversity of operations, either singly or in combination with other tooling.

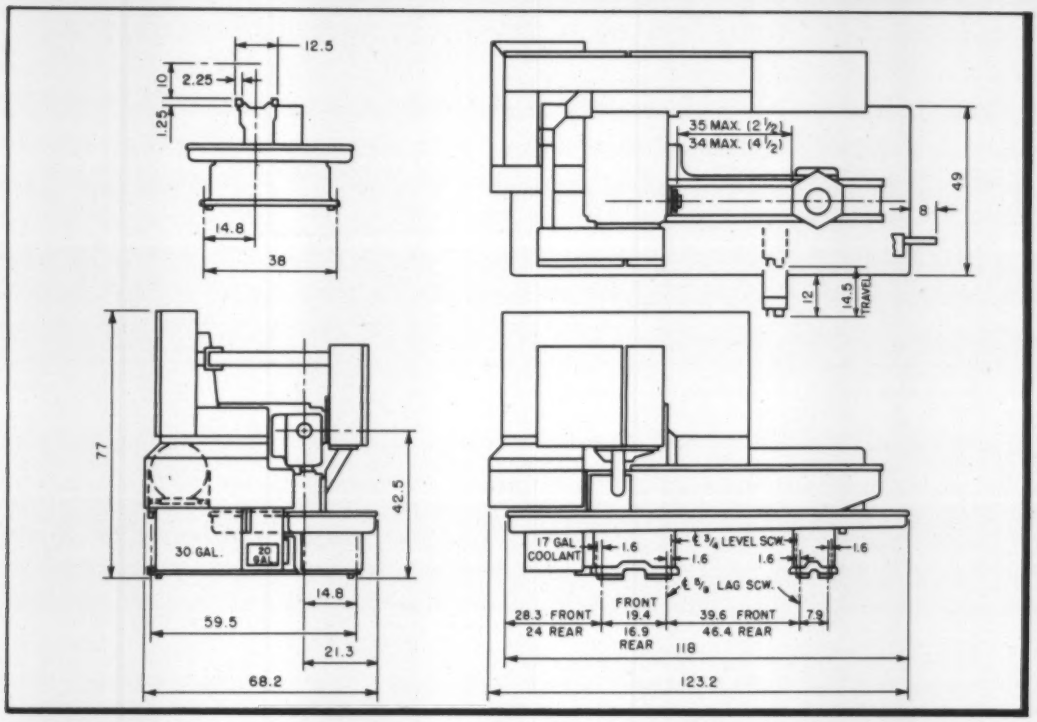
The high hexagon turret eliminates the necessity of multiple turning heads and at the same time provides faster, simpler and more accurate tool setting.



MATERIAL: CAST IRON

JONES & LAMSON AUTOMATIC TURRET LATHE				
Turret Position	Cross Slide Position	Operation	Cutting Speed Ft./Min.	Feed Per Rev.
1		R. TURN K, H & D	335	.0147
	FRONT	FACE B, FACE AND NECK J, CHAMFER M	454	.0115
	REAR	GROOVE C — FACE F R. FORM, H — FACE, N	312	.0115
2		TURN, L — BORE, P CHAMFER, Q	406	.0103
3		R. CORE, H-F. CORE, G CHAMFER, E	400	.0054
4		REAM, P-CHAMFER, A	118	.585
5		F. TURN, K-F, CORE, H F. TURN, D	369	.0076
6		THREAD, L	222	.0537

2.50 MIN. FLOOR TO FLOOR — 24 PCS. PER HR. AT 100%



THE ATL OFFERS UNEQUALLED CAPACITY

	ATL 2½		ATL 4½	
COLLET CHUCK CAPACITY	**Minimum**	**Maximum**	**Minimum**	**Maximum**
Round	3/16	2½	1"	4½"
Hexagon	3/16	2⅛	1"	3⅞"
Square	⅜	1¾	1"	3⅛"
SPINDLE				
Hole in spindle	3"		5¼"	
Hole in collet tube	2⅝"		4¾"	
Spindle nose	8" type A-1		11" type B-1 American Std.	

ATL-4½" — Spindle Speeds — twelve (12) forward and reverse (24-speed headstock in same ranges available as option).

18 — 750 range: 18 - 25 - 35 - 49 - 69 - 96 - 137 - 192 - 270 - 380 - 530 - 750

24 — 1000 range: 24 - 33 - 47 - 66 - 93 - 130 - 182 - 255 - 360 - 505 - 705 - 1000

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40 — 2000 range: 40 - 67 - 93 - 132 - 185 - 260 - 365 - 512 - 719 - 1109 - 1419 - 2000

Swing (12" dia. Universal Chuck)

Over ways . . . . . 21¼"

Over carriage guides . . . . . 18½"

Over carriage cross slide . . . . . 13"

Carriage

Cross travel . . . . . 14½"

Rapid traverse . . . . . 250"/min.

Cross feeds, front and rear — fifteen (15) — .48 - .615 - .785 - 1.00 - 1.28 - 1.64 - 2.10 - 2.68 - 3.43 - 4.38 - 5.61 - 7.17 - 9.17 - 11.72 - 15.0 inches/minute

Hexagon Turret

Turning length . . . . . 24"

Diameter of hole in turret . . . . . 3.125"

Maximum distance from face of spindle to face of turret . . . . . 35" (2½") 34"(4½")

Feeds — fifteen (15) — .96 - 1.23 - 1.57 - 2.01 - 2.57 - 3.28 - 4.20 - 5.37 - 6.86 - 8.77 - 11.21 - 14.35 - 18.35 - 23.45 - 30.0 inches/minute

Rapid traverse . . . . . 500"/min.

Center of tool holes to top of saddle . . . 4⅞"

Bed

Width across ways . . . . . 12½"

Top of ways to spindle center . . . . . 10"

Motor

40 HP maximum (1800 R.P.M.)

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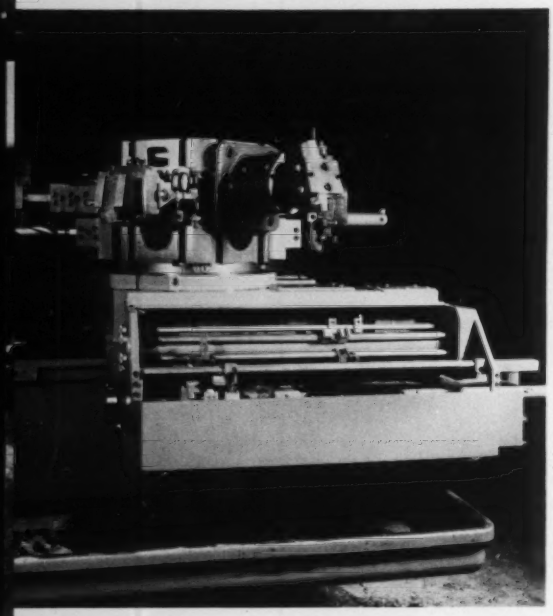

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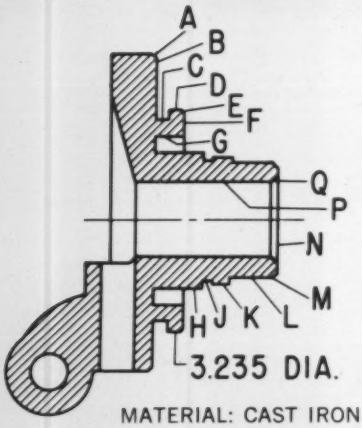

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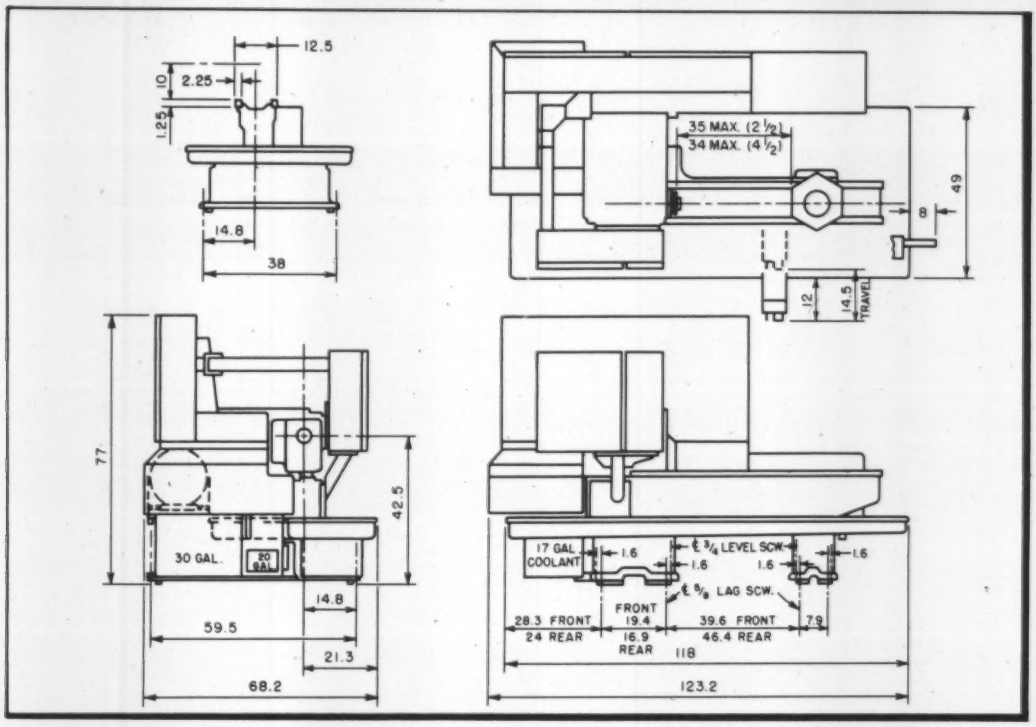

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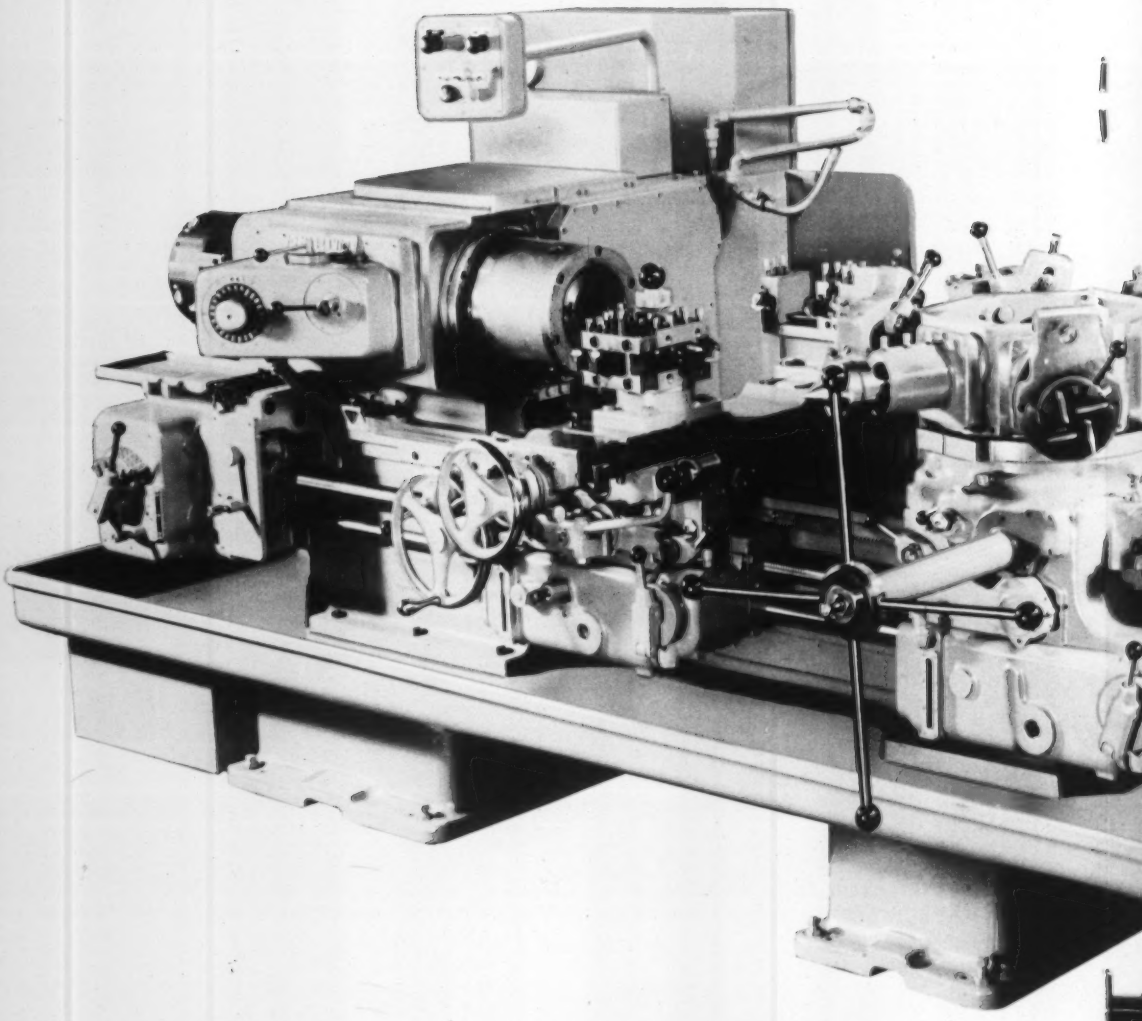
NEW RAM AND SADDLE T



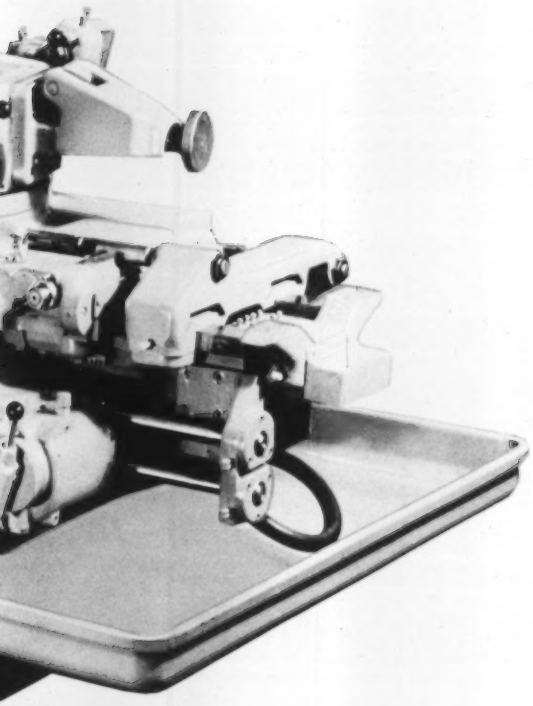
TYPE TURRET LATHES

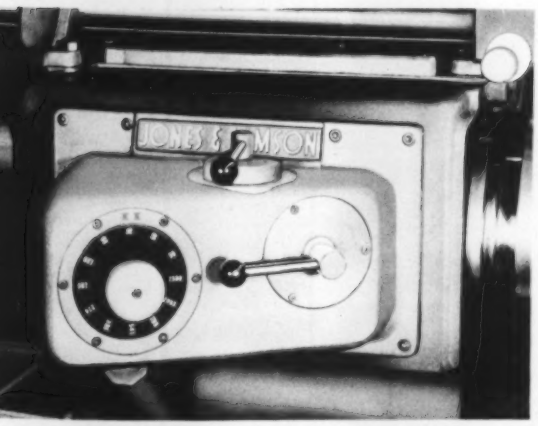
Instant Speed Changes

Hydraulic Clutches

No Gear Shifting

Single Speed Motor





These new J & L lathes are really new. No mere face lifting here. Both lathes have been completely redesigned from the floor up!

Both the Ram type and Saddle type lathes are equipped with multi-speed hydraulic headstocks and are capable of giving you more chips per tool, more pieces per hour, and more profit per job.

The new design of these machines starts with a greater leg depth for more stable footing. New cross-ribbed bed design provides even greater rigidity for heavy cuts — and gives straight-line chip disposal out the back. The new wide pan includes a built-in accessible coolant tank at the head end of the machine. The new headstock transmits up to 40 HP.

An extremely important feature is the hydraulically operated clutches, which change pre-selected spindle speeds quickly and automatically.

Other features include: motor mounted on the rear of the machine; a new carriage of rugged design, on which the stop spool is more conveniently located; heavy duty aprons which allow the adaptation of full length lead screw threading attachments (as well as the extremely versatile 2-Dimension, 180° carriage tracer); built-in independent pumps, which supply forced lubrication to the aprons, carriage, and saddle.

The new Ram type machines are available in #4, #5, #5-3½, and #5-4½ sizes. Saddle types in the new design are #7-2½, #7-3, #7-3½, and #7-4½. 12- or 24-speed headstocks are available.

These new machines offer even more power, greater accuracy and easier operation than their famous predecessors.

Spindle Speed Ranges

15-750 RPM, 20-1000 RPM, 24-1200 RPM, 30-1500 RPM, 40-2000 RPM, various speed ranges available dependent upon size of machine.

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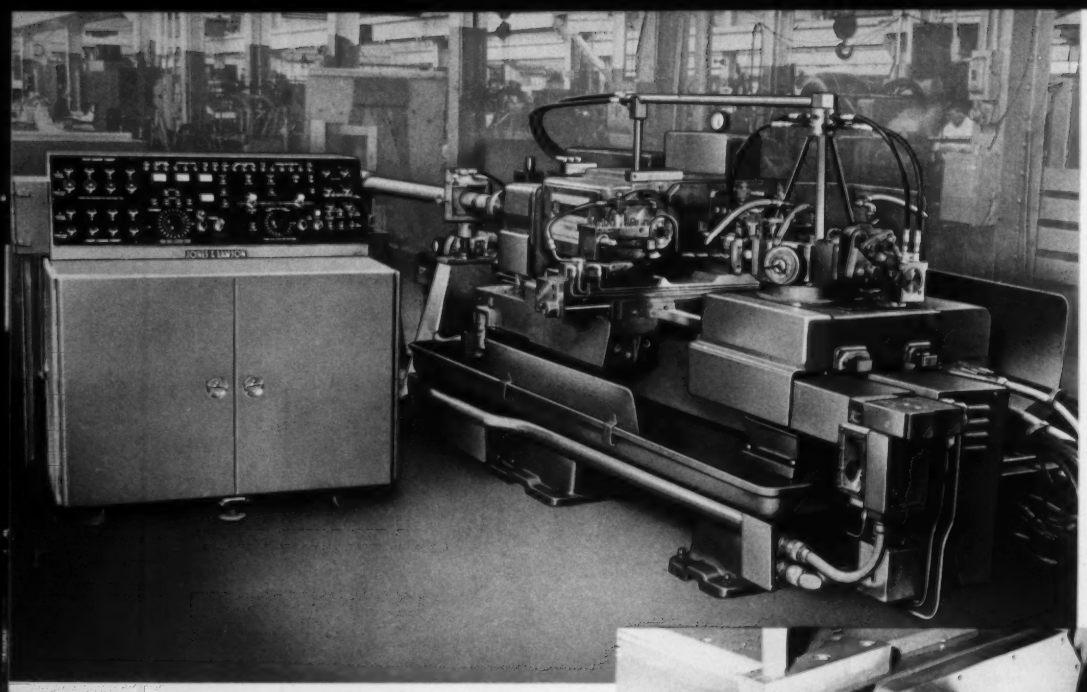
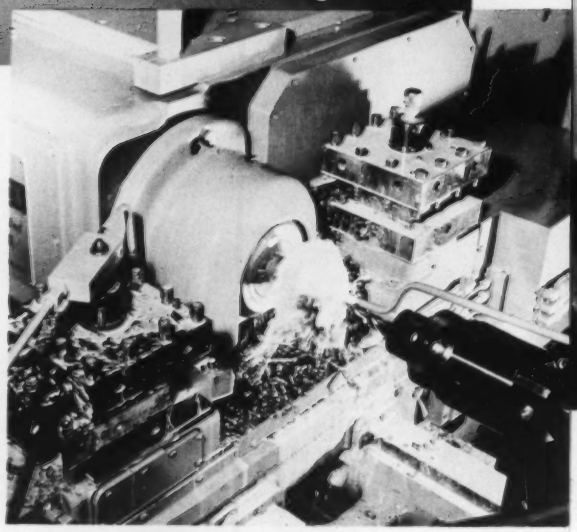




TAPE CONTROL TURRET LATHE

Shatters set-up time, lead time, and costs on short runs

After tape and tooling are prepared, the J & L NCTL can be set up and working on the first piece in approx. 15 minutes. And this would be an extreme case where tools at all 14 tooling positions would have to be changed. Now, consider more realistic operations (such as a series of shafts or gear blanks or other similar parts). This is where the probabilities favor the changing of only one or two tools at an average of approx. one min. per tool. And at this point the economic benefits of tape control turret lathe operation become startling indeed.

This turret lathe (built in two sizes, 21″ or 30″ swing) makes parts automatically using pre-set tools according to instructions provided by standard 1″ wide 8-channel punched tapes. It can be set up for either bar work or chucking work.

The carriage, cross-slide and saddle all have motion at any of 16 feed rates or in fast motion. Each slide moves to location within + or −.001″ and repeats within + or −.0005″. Therefore, repetitive tolerances + or −.0005″ on location and on diameter can be expected, after the first piece has been made and adjustments dialed to compensate for tool spring or setting.

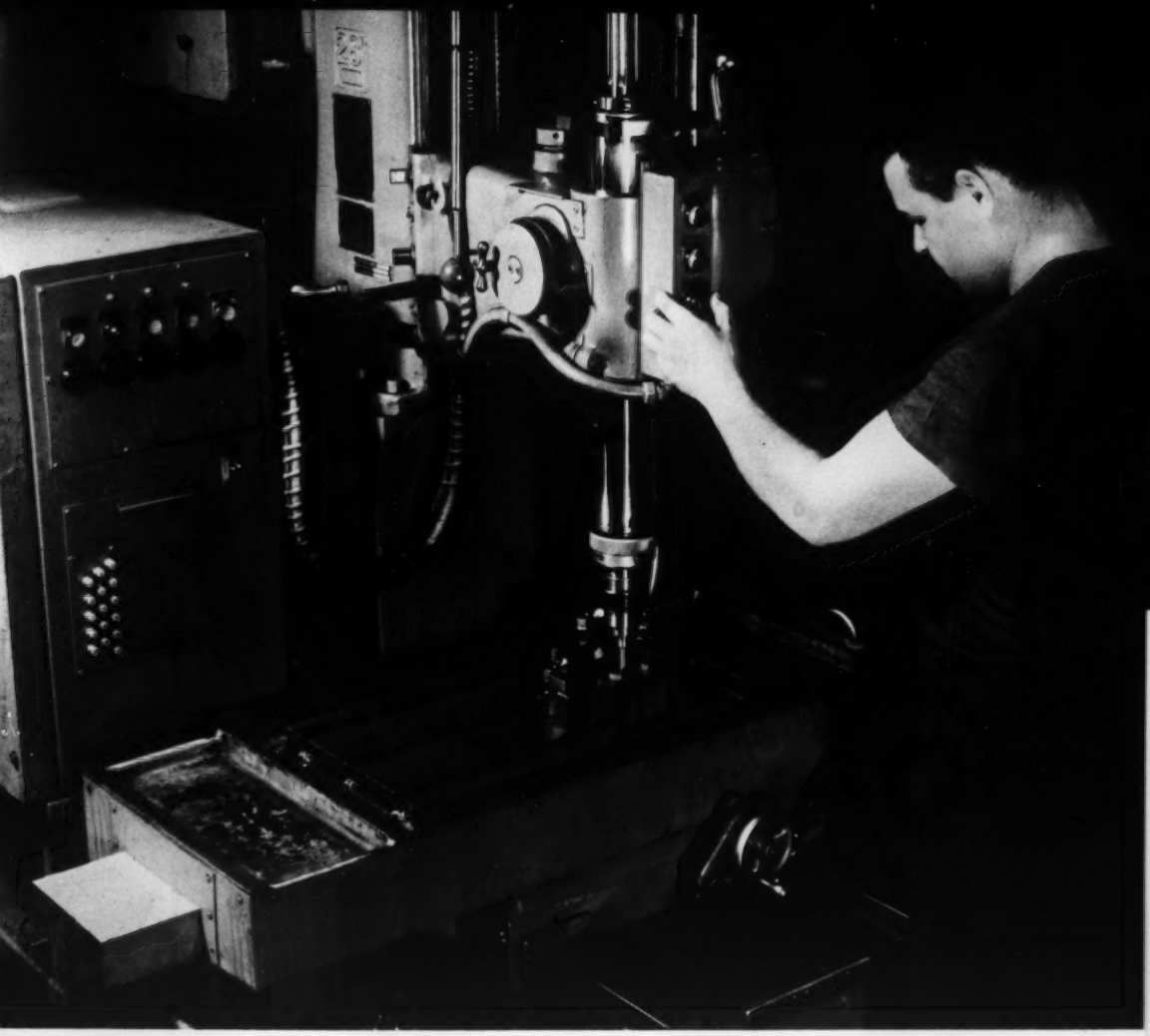
The control system provides tape control for carriage, cross-slide and saddle movements; speed and feed changes; hexagon turret indexing, front and rear square turret indexing; coolant, bar feed, collet chuck; opening and closing die heads and roller turners and accessory tools mounted on the hexagon turret.

Corrections for 22 end-point locations of the tool-carrying members, without need for repunching the tape are provided on the console with up to + or − .015″ adjustment. The system is capable of operating two motions simultaneously.

Standard Tape and Code

This numerical control uses a word-address code system. The 1″, 8-channel, tape is prepared with an EDP typewriter, such as the Friden Flexowriter. A simple language is used for coding. Alphabetical abbreviations provide functional designations, while numerical information is used to specify speeds, feeds and distance, or end-point, measurements.

Distances are in actual decimal dimensions while speed and feed numbers refer to steps in the feed-speed selection range. For example, from the 24 forward (12 reverse) available speeds, the speed setting code 16 would mean 512 RPM. Speed ranges may vary from a low of 20 to 1000 RPM to a high of 40 to 2000 RPM.



If the J & L turret lathe insert is missing, write JONES & LAMSON, 517 Clinton St., Springfield, Vermont, for your copy.

TAPE CONTROL POSITIONING IS HERE TO STAY

Tape control positioning tables have unquestionably proved their capabilities. They reduce production lead time, eliminate jigs, minimize tool changes and wear, reduce set-up time, increase positioning accuracy, shorten cycle time, reduce operator fatigue and required skill, and insure repetitive accuracy.

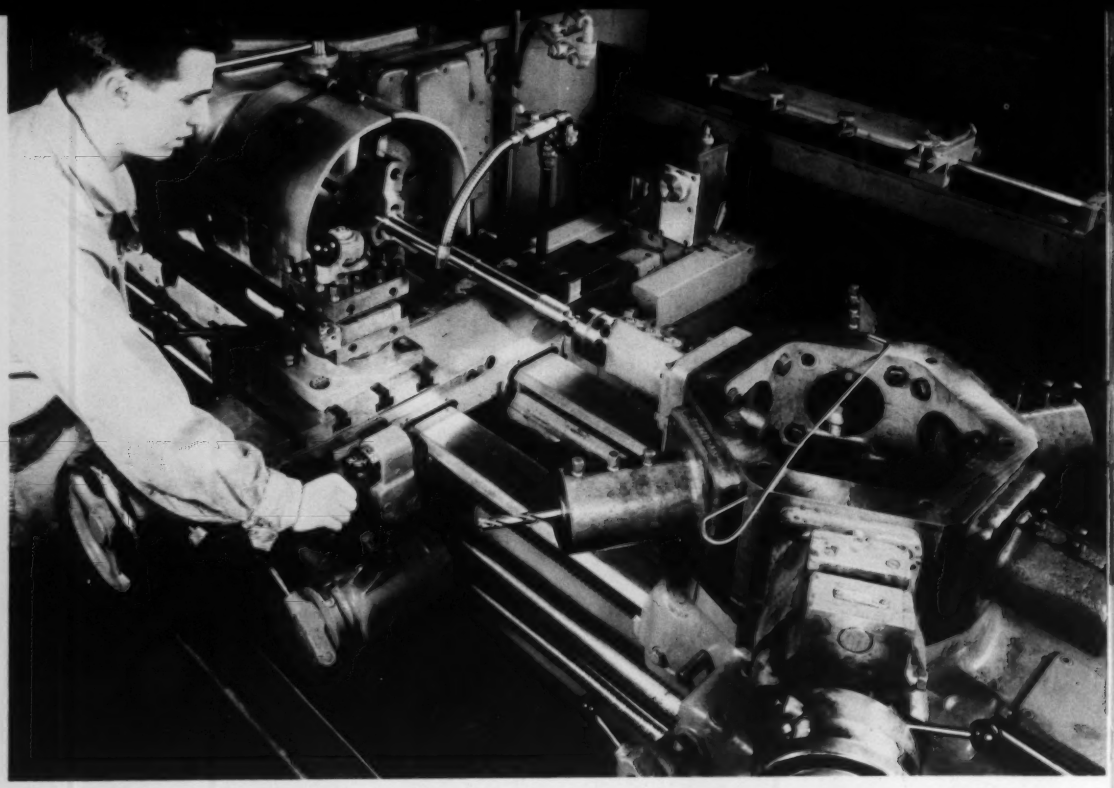
The competitive advantages of J & L Tape Controlled Positioning Tables assure potential users of getting all the above capabilities to the highest degree.

Here's why:

1. The J & L Positioning Table is a solid machine tool, accurately designed and ruggedly constructed.
2. Its design allows for the adaptation of a variety of different types of electronic control units. The user may choose units for purposes of standardization, service, or other reasons.
3. J & L Positioning Tables may be applied to a variety of makes of radial and post drills, including those with automatic cycling and turret indexing.
4. Fast, positive, accurate point-to-point positioning is assured with the J & L Positioning Table. Its closed loop, two-stage hydraulic servo system provides an average travel rate of 190″ per minute, including decelerating and stopping at the desired position.
5. Repeatability of the J & L Positioning Table is ±.0005″ no matter who's operating it.
6. J & L Positioning Tables have been in operation in the field for over three years. Performance record? Satisfied users answer that question with comments like these: "Saved $4,000 in first 6 weeks of production thru cancelled orders for jig drills."; "Eliminated storage and maintenance of $29,000 worth of jigs."; "Saved an average of 30% to 40% in floor-to-floor time on every job put on a J & L Positioning Table over a full year of operation."

So performance is a matter of record.

Table Travel: 12″ x 20″, 20″ x 20″, 30″ x 40″



180° TURRET LATHE TRACING

Here's the versatile combination that gets the most out of one chucking . . . minimizes handling time . . . increases accuracy.

The J & L hydraulically powered Two-Dimensional Tracer mounts on the rear of the cross-slide carriage of J & L Turret Lathes to provide *complete* machining to tight tolerances. A single stylus and flat template control the cross-slide table travel and longitudinal carriage travel. A single feed selector controls feed in all directions.

Normal turret lathe operations can be used, either in conjunction with tracing, or separately. For example, operator can rough out, trace thru more than 180° of contour while turning, and 180° while facing. *And complete control for diameter is accomplished with the conventional graduated handwheel, for either tracing or mechanical operation.*

Tracer turning capacity is the same as mechanical capacity of lathe in 20" increments. Facing capacity is up to 6" radius change. Feed range is ½" to 18" per minute. Cross-slide has hydraulically operated rapid traverse apron and heavy-duty diameter feed screw. 45° and 60° tracing units are also available.

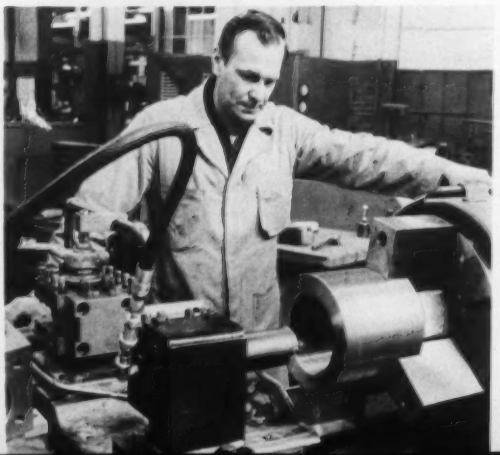
Single Point Threading to a Finish of 15-20 RMS IS COMPLETELY – *AUTOMATIC*

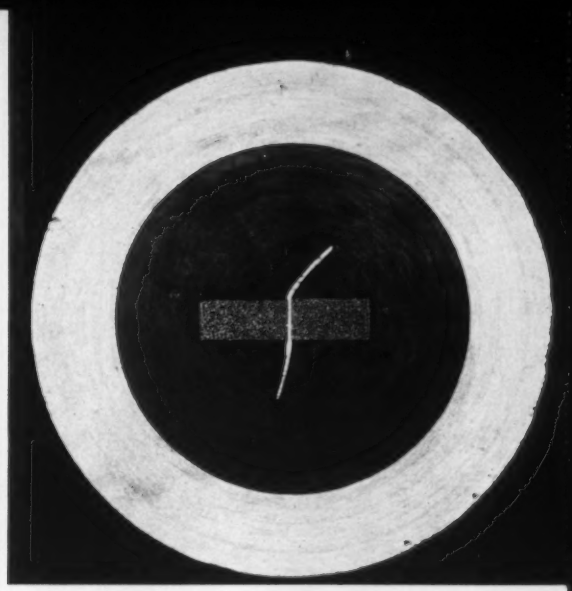
That's right! With the J & L AUTO THREADER straight, taper, and combination threads can be *automatically* chased, internally and externally, to high precision finish.

Mounted on the cross-slide, the AUTO THREADER utilizes the full capacity, rigidity, accuracy, and PRODUCTIVITY of standard J & L Turret Lathes. Precision lead control is maintained by positive engagement of a split-nut follower to the full depth of a hardened-and-ground leader. Uniform thread length is assured by positive stop and follower nut disengagement, together with rapid tool withdrawal. Standard pitches are readily obtained thru interchangeable leaders and followers.

AUTO THREADER utilizes the swing, bar capacity, distance between centers, spindle speeds and motor ratings of the complete line of J & L Universal Ram and Saddle Type Turret Lathes. Max. threading length: 7" on Standard Turret Lathes, and 11" on No. 10 Turret Lathes.

Threads per inch: 2-64; Max. passes per cycle: 16; Max. tapers: 3½" per ft. (12" long standard); 4¾" per ft. (8" long optional); Max. number of starts: 4.





If the J & L turret lathe insert is missing, write JONES & LAMSON, 517 Clinton St., Springfield, Vermont, for your copy.

LIGHT CONCENTRATORS WITH J & L OPTICAL COMPARATORS OPEN NEW FIELDS IN MINIATURE ASSEMBLY INSPECTION

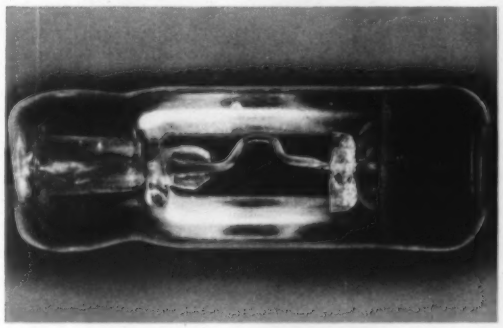
Simply slip on a CENTRALITE or PARABOLITE adapter, and your J & L TC or FC-14 Optical Comparator can take on seemingly impossible inspection jobs!

For example, CENTRALITE (upper left) makes possible the highly accurate image (upper right) of a tiny recording head used in a computer component. Light is concentrated intensely on the head and reflected back through the J & L projection system onto the viewing screen of the Comparator at 31.25 magnifications. Note that the two magnetic poles, separated by a magnetic insulator (white streak) and imbedded in plastic, are clearly visible for inspection.

Tunnel and Mesa Diode Inspection

In illustration at right, PARABOLITE permits detailed inspection of a tiny tunnel diode assembly. PARABOLITE surrounds the diode with concentrated light to provide an extremely sharp image at 31.25 magnifications. By simply rotating the diode, inspector can take a close look at seal, bubble configuration at fusion points, joining of the lead wire to the bead, gold contact to wafer, surface condition of wafer, and other vital details.

Two simple ways to *tailor* light to your inspection applications.



This reproduction of the reflected image of the diode at 31.25 magnifications has been reduced for printing purposes. Nevertheless, components are clearly defined.

■ *Send leasing information . . . plus . . . catalogs containing complete details on:*

- ☐ Ram Type Universal Turret Lathes
- ☐ Saddle Type Universal Turret Lathes
- ☐ Hydraulic Tracing Attachment
- ☐ Auto Threader
- ☐ Automatic Turret Lathes
- ☐ Numerical Tape Control Turret Lathes
- ☐ Numerical Tape Control Positioning Table
- ☐ "Avoidable Costs" Replacement Formula
- ☐ Optical Comparators

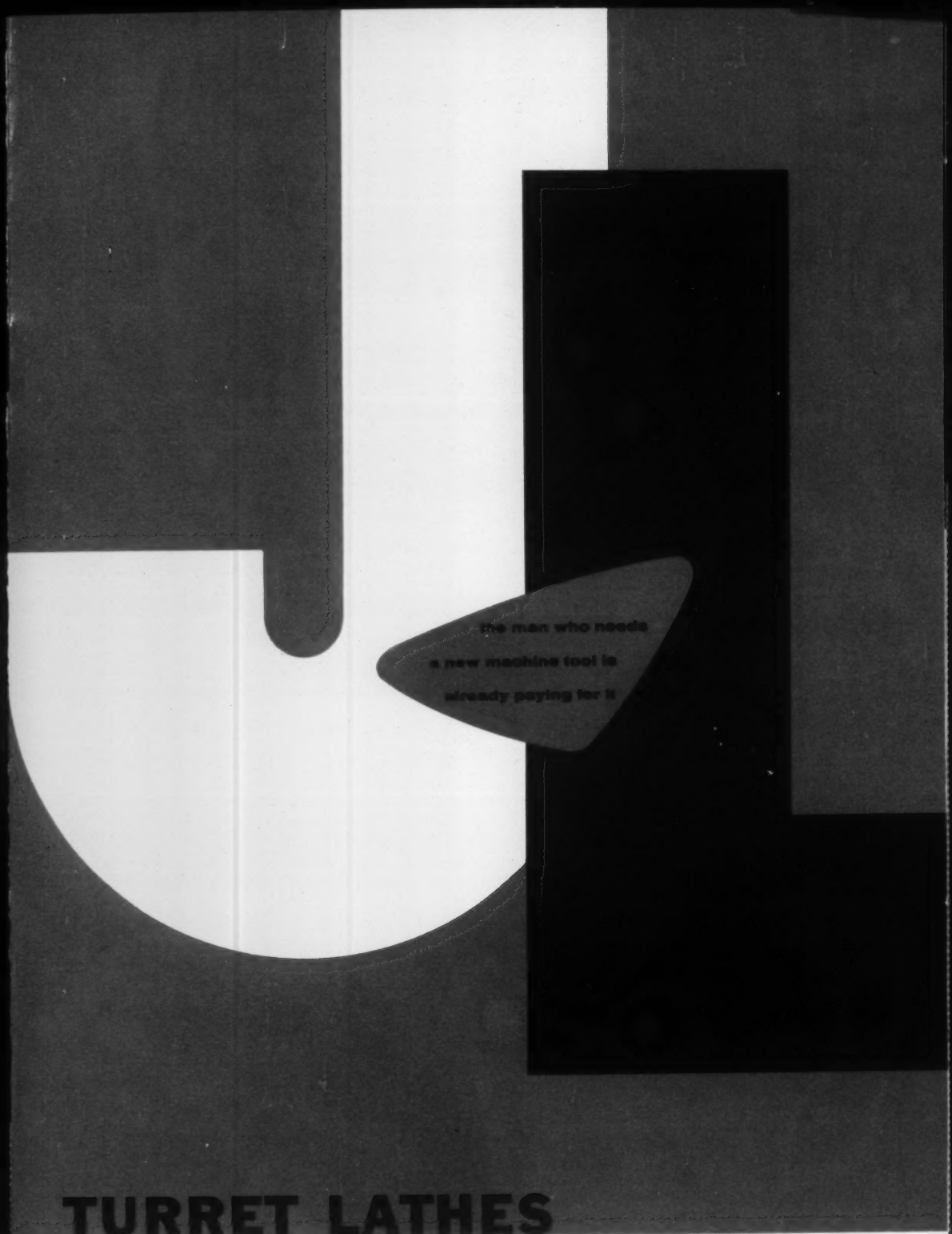
NAME.....

TITLE.....

COMPANY.....

STREET.....

CITY.....ZONE.....STATE.....



TURRET LATHES

AUTOMATIC • STANDARD • TAPE CONTROL
all from

JONES & LAMSON MACHINE COMPANY

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Tungsten-Rhenium Size Range Grows

Refractory alloys will have major uses in space and in electronic applications

WIRE as fine as 0.0005 in. diameter and 2000 ft long and short strip up to 4 in. wide and 0.005 in. thin are part of a newly widened range of sizes of tungsten-rhenium alloys announced by Hoskins Mfg. Co., Detroit.

The refractory alloys combine some of the best characteristics of tungsten (notably high heat resistance) and rhenium, (ductility and ease of fabrication).

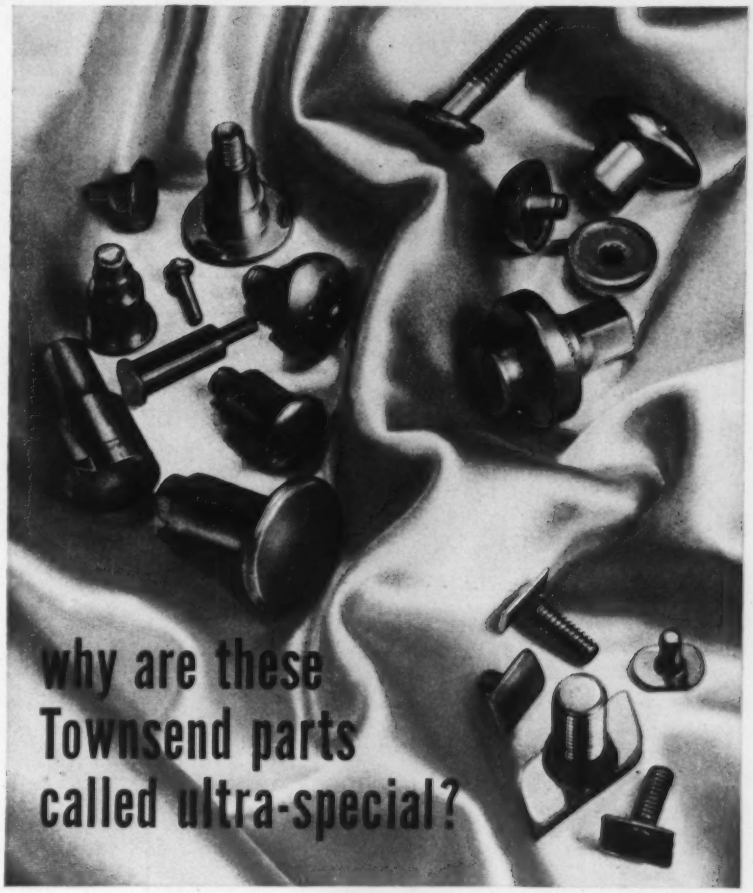
Primary applications for the alloys are in space vehicles, nuclear reactors, and many advanced electronic, thermoelectric, industrial heating, and structural products.

• **Doubled Range**—Due to inherent characteristics of the two refractory metals and the problems encountered in converting them from powder into useful, homogeneous alloy forms, initial production was confined to a limited range of sizes.

User reports say, however, that Hoskins new production techniques have already "more than doubled" the range of sizes in which the alloys can be obtained. Process engineers at Hoskins feel they should be able to produce the material in an even wider range of wire, rod, ribbon, and strip sizes when additional equipment is installed.

• **Properties**—The new tungsten, 26 per cent rhenium alloy wire and strip has high tensile strength at elevated temperatures, good electrical resistivity, and a melting point of about 5800° F. The material also is said to have relatively good ductility at room temperature and it remains ductile after being heated through the recrystallization range.

Hoskins says its new process can also be used to produce various combinations of molybdenum and rhenium. Those alloys are more ductile than the tungsten base alloys and should find wide use as superconductor and welding materials plus many high temperature structural parts, says Hoskins.



We call the metal parts shown here Ultra-Special because they are the result of completely new cold-forming and finishing techniques. They are typical examples of how users are reducing costs by taking advantage of the strength, improved quality, close dimensions and economy of mass-producing parts by cold-forming.

In the past, the limitations of the cold-forming process forced manufacturers to accept parts which were made by other, more costly methods. Now, through extensive research and development work Townsend is cold-forming Ultra-Special items with intricate shapes and critical dimensions held to tolerances as close as .001 inch. They may be made by combining cold-heading processes with impact extrusions, special heat-treatment and coatings, to name but one of the new techniques.

The use of Townsend Ultra-Special items in your product assembly could provide the means to make better products at lower costs. Investigate by asking a Townsend field engineer to call. Write Townsend Company, Engineered Fasteners Division, P. O. Box 71-C, Ellwood City, Pa.

Townsend Company

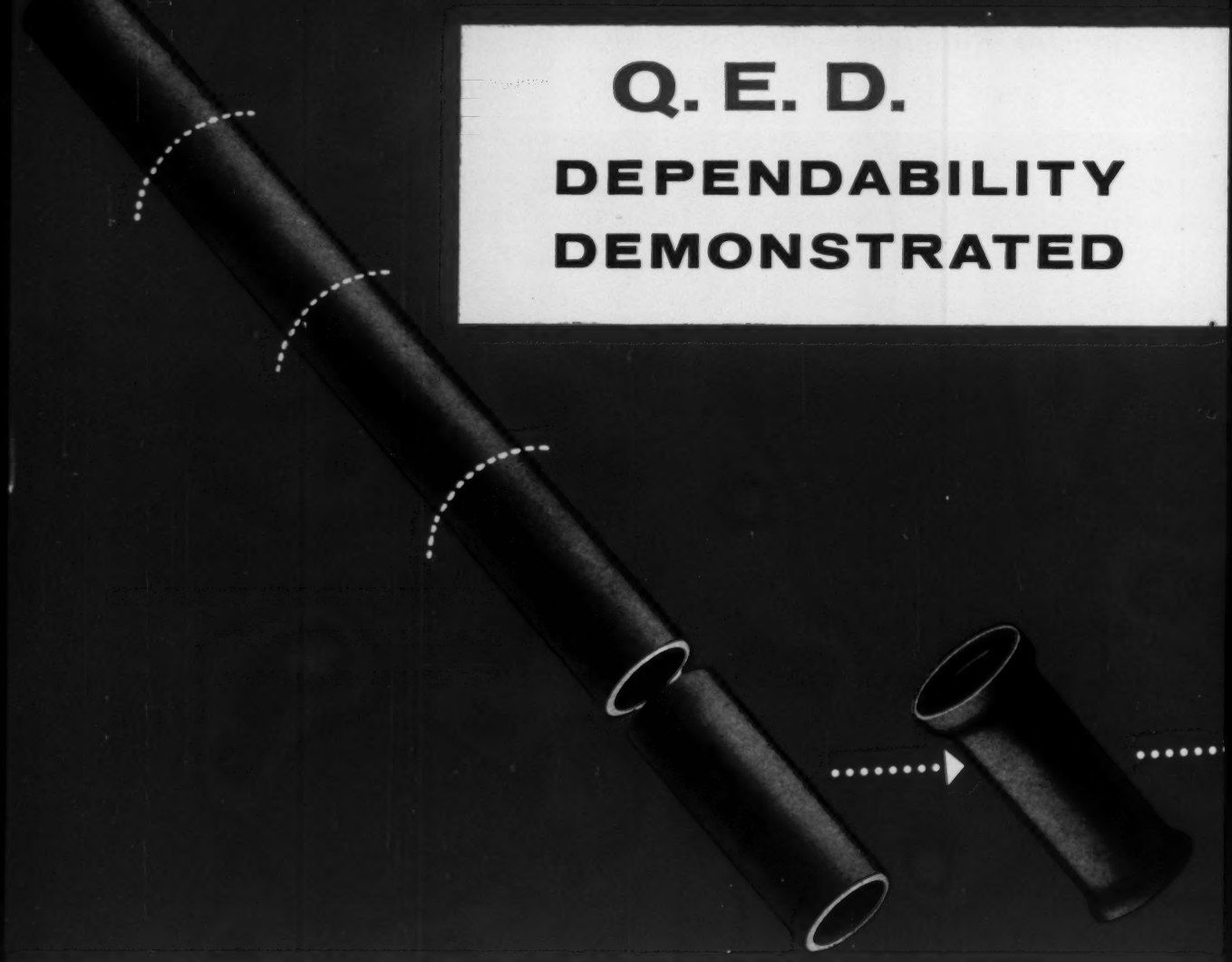
ESTABLISHED 1816

Engineered Fasteners Division

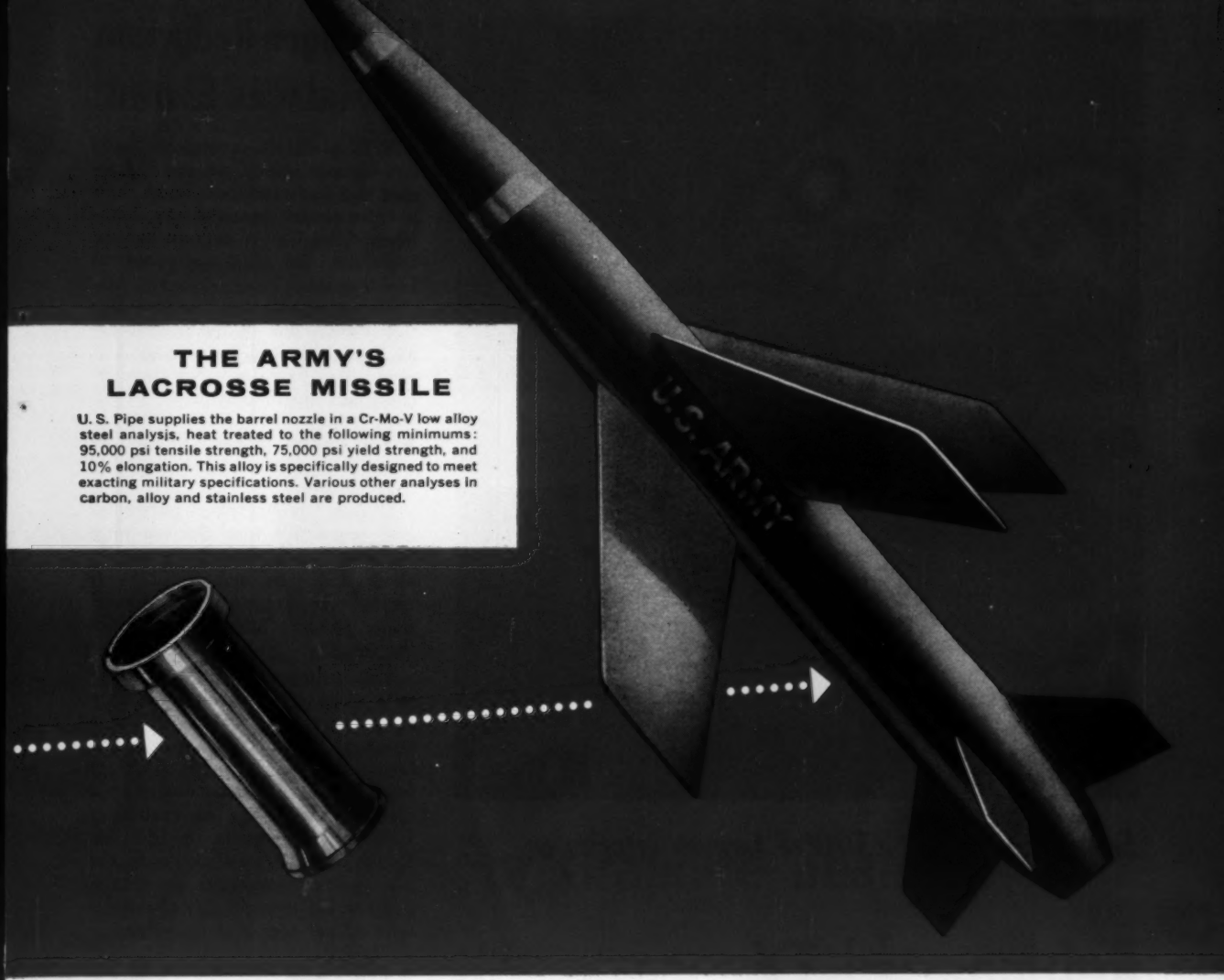
ELLWOOD CITY • PENNSYLVANIA

In Canada: Parmenter-Bulloch Manufacturing Co., Limited, Gananoque, Ontario

Q. E. D.
DEPENDABILITY DEMONSTRATED



Now... basic characteristics of Metal Mold Centrifugal Casting contribute to the reliability of new Lacrosse Missile



THE ARMY'S LACROSSE MISSILE

U. S. Pipe supplies the barrel nozzle in a Cr-Mo-V low alloy steel analysis, heat treated to the following minimums: 95,000 psi tensile strength, 75,000 psi yield strength, and 10% elongation. This alloy is specifically designed to meet exacting military specifications. Various other analyses in carbon, alloy and stainless steel are produced.

Centrifugal casting, a direct production approach to quality, is now finding new and increasingly useful applications in rocketry and missile engineering.

U. S. Pipe, for example, supplies the alloy steel barrel nozzles for the Army's Lacrosse Missile as semi-finished, partially hot-forged lengths. These production pieces are being supplied to The Martin Company, Orlando, Florida — prime contractor for the Lacrosse, and to Parish Pressed Steel, Reading, Pennsylvania — subcontractor to The Martin Company. The contractors then finish machine them for assembly in the propulsion units.

Centrifugal casting offers ordnance design engineers several outstanding advantages:

1. Versatility. Many different alloy and stainless steel analyses, sizes and contours can be produced starting with a hollow billet.

2. Dependability. Years of experience in producing metal mold centrifugal castings assures high quality and reproducibility.

3. Economy. Maximum utilization of the *right* material produced with a minimum of processing to achieve overall efficiency.

Can these basic qualities meet the requirements and lower the cost of your material needs? Write today and outline your particular problem.

Size Range & Composition Flexibility
Outside Diameter—6" to 60" • Wall Thickness—⅜" and up
Length—Up to 25'
Types of Steel Cast, Carbon, Alloy and Stainless—all standard AISI and ACI grades.

UNITED STATES PIPE & FOUNDRY CO.

Steel and Tubes Division

STEEL & TUBES U.S. PIPE DIVISION

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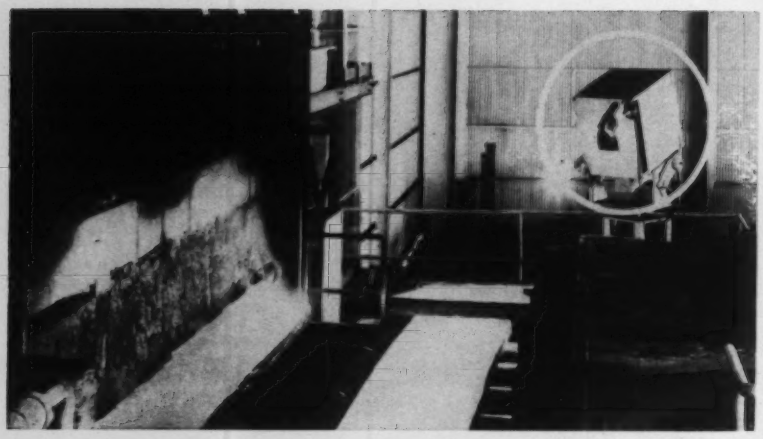
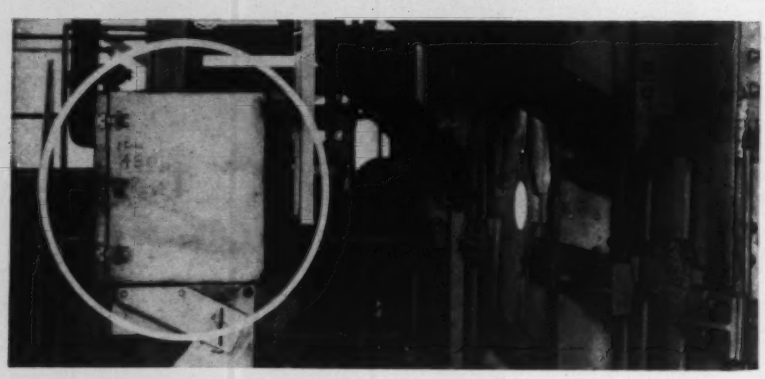


One camera watches charging operation . . .



Second peers into 2300° F furnace interior as . . .

Refrigerated TV Checks Hot Processes

• USING TWO, refrigerated television cameras, one operator keeps close tab on a slab reheat furnace and a charging operation at U. S. Steel's McDonald Works at Youngstown. Considerable improvements in process control and operator comfort are reported.

One camera takes a continuous picture of the charging operation and the other, aimed through a small opening, shows slabs inside the furnace just before discharge. Side by side television screens permit the operator to monitor both operations.

The cameras (3 ft away from the furnace in which slabs are heated to about 2300° F) are housed in compact, insulated boxes. Heavy duty, refrigerated coils line the compartment walls and keep the cameras at safe operating temperatures (below 90° F). No downtime from overheating has occurred.

The equipment was designed and manufactured by Lintern Corp. and distributed by Larco Inc. Both are in Painesville, Ohio. Installation took about 8 hours with no interruption of furnace operations, says Larco.

Hydrogen Reduction Advantages Shown

• THE H-IRON process for using hydrogen to reduce iron ore is practical and can produce briquets suitable for electric furnaces, says Bethlehem Steel Co. in announcing the completion of pilot operations at Los Angeles.

The company explains that further exploitation of the process depends on the need for primary iron production facilities. No commercial plans are imminent.

• The process produces highly reduced iron powder at low operating temperatures.

During production, pulverized iron ore is fed into the top of a cylindrical steel vessel (it weighs about 238 tons and is 122½ ft high). Hydrogen is introduced under pressure into the bottom of the vessel.

The hydrogen and iron ore meet in a series of four fluid beds at a temperature of about 850° F and a pressure of about 440 psi. The powder is briqueted after discharge from the vessel and passivated in a special furnace at a temperature of 1600° F to prevent reoxidizing. Rated for 110 tons per day, the pilot plant's maximum production is up to 121 tons per day of powder with 95 per cent plus reduction.

• Full scale melting tests of briquets in electric furnaces show that a consistent degree of reduction results in a consistent practice.

With 95 per cent reduced H-Iron briquets making up as much as 30 per cent of the charge, indicated differences in heat time, power consumption, and fluxes were small compared with data for scrap charges. Above 30 per cent of the charge, the gangue in the ore caused some increase in those factors. Yields for 95 per cent reduced H-Iron heats were the same as for non-H-Iron heats. Lower degrees of reduction increased heat time and power consumption, and decreased yield.

In the final phases of the program, Bethlehem tried some production heats in which pyrophoric H-Iron powder—not briqueted or passivated, was charged directly into

an electric arc furnace. Up to 40 tons of 95 per cent plus reduced powder—40 per cent of the charge—was melted smoothly with normal yield and a slight increase in heat time, power consumption, and fluxes. Bethlehem also reports that an important advantage of H-Iron over scrap is freedom from contamination by other metals.

The process, jointly developed with Hydrocarbon Research Inc., Trenton, N. J. (exclusive licensors), dates back about ten years when Bethlehem began searching for methods for producing iron in areas where metallurgical coke and limestone are not readily available. The company located the pilot plant on the West Coast where it has no blast furnaces.

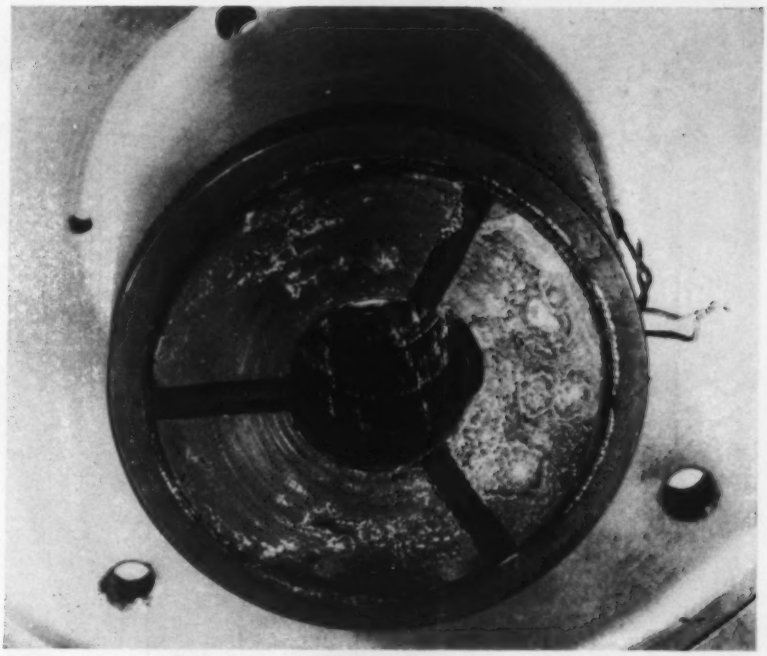
X-ray Images Are 1000 Times Brighter

"WE CAN NOW see inside solids as easily as a physician looks inside a human, thanks to a new electronic system that brightens x-ray images a thousandfold. With it, we can pinpoint the atomic architecture of crystals," says Westinghouse Electric Corp., Pittsburgh.

Dr. G. W. Goetze and Dr. Abraham Taylor point out that the new system makes visible x-ray patterns that were formerly obtained only with photography.

• **What It Can Do**—Westinghouse scientists now are able to watch atom locations shift position as crystals change under the impact of temperatures or other outside influences. They can take split-second photographs or motion pictures of the entire process.

The experimental equipment combines into one device the Fluorex (standard x-ray image amplifier) and the Astracon (an amplifier of visible light). X-rays from a portable source can be beamed through a crystal. The pattern produced is transferred directly to a sensitive photosurface on the input face of the combined Fluorex-Astracon. A pattern of electrons released is speeded up and focused by electrical voltages on a 0.0001 in. film near the rear of the tube. The film is able to release 100 electrons for every electron striking its surface.



Results of testing a three piece bearing show . . .

Heat, Loads Not Problems For Graphite Bearings

• **PROBLEM: Design bearings for a 0.5 hp, alternating current motor for aircraft service at altitudes up to 80,000 ft and temperatures up to 870° F—without external cooling or lubrication. Rated output torque is 3 in.-lb, with a 3 lb thrust load and a 10 lb radial load.**

• **SOLUTION: A three piece configuration of carbon-graphite material, reports AiResearch Mfg. Div., Garrett Corp., Los Angeles.**

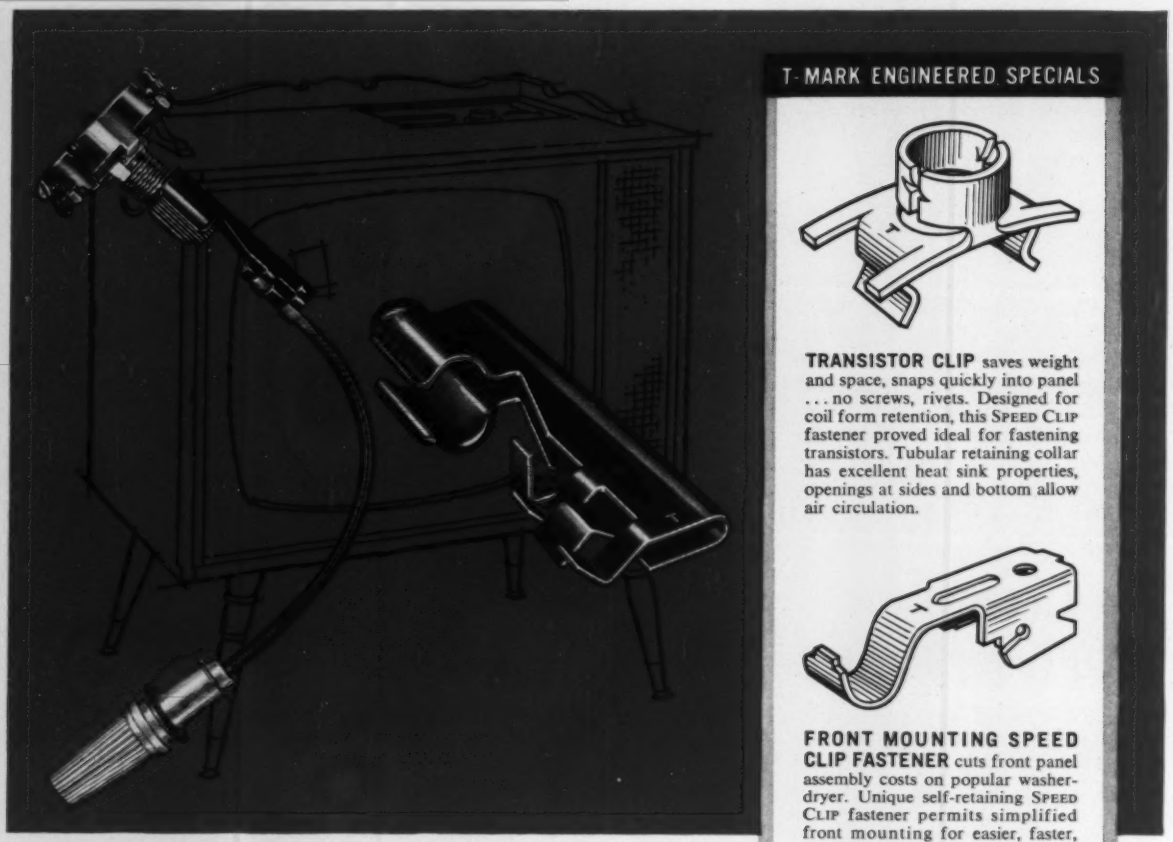
The material is Graphitar 2490, a high temperature and oxidation resistant grade made by United States Graphite Co., a division of Wickes Corp., Saginaw, Mich. AiResearch says the material has demonstrated a low coefficient of friction, high wear resistance, and good stability.

• **A special mounting takes advantage of the material's high compressive strength and minimizes its relatively low tensile strength.**

In addition to the three radial segment configuration of each bearing, a length to width ratio of more than 2:1 was used to distribute the high radial load. The bearings were precision bored after assembly with the motor housing and end bells.

Flame plating the shaft bearing surfaces with aluminum oxide eliminated galvanic action between the bearings and motorshaft under high humidity conditions.

To conform with military specifications, the motors were required to pass dielectric, acceleration, shock, vibration, life, humidity, salt spray, and load tests. Since final ambient temperature capabilities of the motor were unknown, it was tested at 1100° F for 2 hours. No adverse effects were reported from the heat.



A Tinnerman T-Marked Original...

SPEED CLIP® gives Sylvania easier, more reliable, more flexible assembly

This new Tinnerman-engineered SPEED CLIP fastener provides a faster, more flexible connection between control "pots" and knobs on a TV manufactured by Sylvania Electric Products, Inc. The fastener can be applied wherever similar components are mounted and space limitations pose an assembly problem.

Several advantages are offered over methods previously used. Assembly is easier and faster . . . mating parts are simply pressed together and secured under live spring tension. Built-in ratcheting action permits overload slippage to protect the control from over-adjustment. Designed for use with a flexible cable, mounting of the control is completely independent of the knob location. They can be perpendicular to each other anywhere within 360°. Finally, this fastener is stamped with the Tinnerman T-mark, as are all SPEED NUT® brand fasteners. This is your assurance that Tinnerman quality and total reliability are going into your products wherever these fasteners are specified.

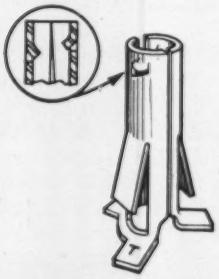
For samples, literature, prices, call your Tinnerman sales office . . . listed in the "Yellow Pages" under "Fasteners." Or write to: *Tinnerman Products, Inc., Department 12, P. O. Box 6688, Cleveland 1, Ohio.*

TINNERMAN
Speed Nuts®
Look for the Tinnerman "T"

T-MARK ENGINEERED SPECIALS

TRANSISTOR CLIP saves weight and space, snaps quickly into panel . . . no screws, rivets. Designed for coil form retention, this SPEED CLIP fastener proved ideal for fastening transistors. Tubular retaining collar has excellent heat sink properties, openings at sides and bottom allow air circulation.

FRONT MOUNTING SPEED CLIP FASTENER cuts front panel assembly costs on popular washer-dryer. Unique self-retaining SPEED CLIP fastener permits simplified front mounting for easier, faster, lower cost assembly of front panel. No welding, staking, screw driving . . . ends scrap hazard. Four fasteners engage panel mounting flange as it slips in place over curved spring fingers. Assures firm vibration resistant assembly, yet easy removal for servicing.



BOWDEN CABLE CLIP is one of many Tinnerman designs to fasten armored cable. Designed for car instrument panels, it's the perfect answer to through-panel cable fastening problems. No welding, staking, clinching, no special mounting brackets or clamps. Live spring tension prohibits vibration . . . prevents loosening.

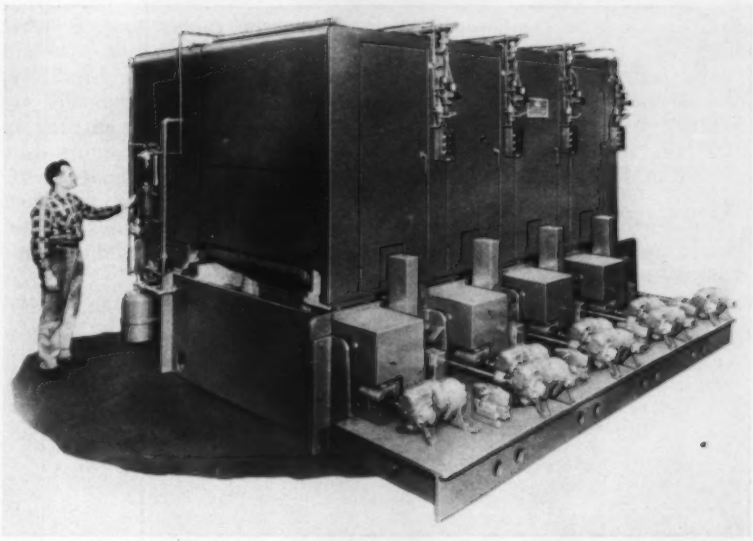
CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Aerocessories Ltd., Treforest, Wales. FRANCE: Simmonds S.A., 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Mecano Simmonds GMBH, Heidelberg.

Stainless Strip Finisher Takes Little Floor Space

THIS grinder and polisher with four heads progressively finishes stainless steel coiled strip 0.010 to 0.250 in. thick and 50 in. wide. The manufacturer says the entire unit requires only half the floor space of four conventional strip grinders and the flexible design permits the addition of any number of additional grinding heads.

Each grinding head has an endless abrasive belt running over a two roll head with a motorized adjustable steel billy roll for increasing the belt pressure against the strip.

The belt on any head can be changed while the others are in operation. Rubber covered guide rolls (built into the machine) create the proper break angle of the strip over each billy roll to flatten the strip at the point of contact with the abrasive belt.



For heavy stock removal, wet grinding is recommended with coolant at 600 gpm. Sludge passes through the bottom of the unit to the filter units. Tests prove that considerably less strip material is lost than with previous methods, says the company. An oil mist spray system is built in for finishing operations on stainless steel.

For further information, *write* Hill Div., Hill Acme Co., 1205 W. 65th St., Cleveland 2, Ohio.

Position Display Fits on Existing Machines

HERE IS a compact position display that's been designed to meet the requirements of operator controlled machines, including retrofit on existing machines. The manufacturer says it permits the machine operator to position machines rapidly and accurately with little fatigue.

A position transducer geared to a leadscrew or precision rack senses magnitude and direction of motion and also provides a signal for indication of machine zero.

The position information is displayed on the cathodes of a bidirectional decimal counter. The unit can continuously display the absolute position from a zero reference

point or the incremental distance between two co-ordinate positions.

Normally, the display is set to count up from machine zero (one end of the machine slide). When direction is reversed, the counter automatically counts down and gives the operator a decimal display of absolute machine position at all times.

The unit is available for one, two, or more axes of motion with typical resolutions of 0.001 or 0.0001 in. and displacements up to 999.999 in. for the 0.001 in. resolution.

For further information, *write* Electronics Div., Rheem Mfg. Co., 5200 W. 104th St., Los Angeles, Calif.

Adhesive Holds Wide Variety of Materials

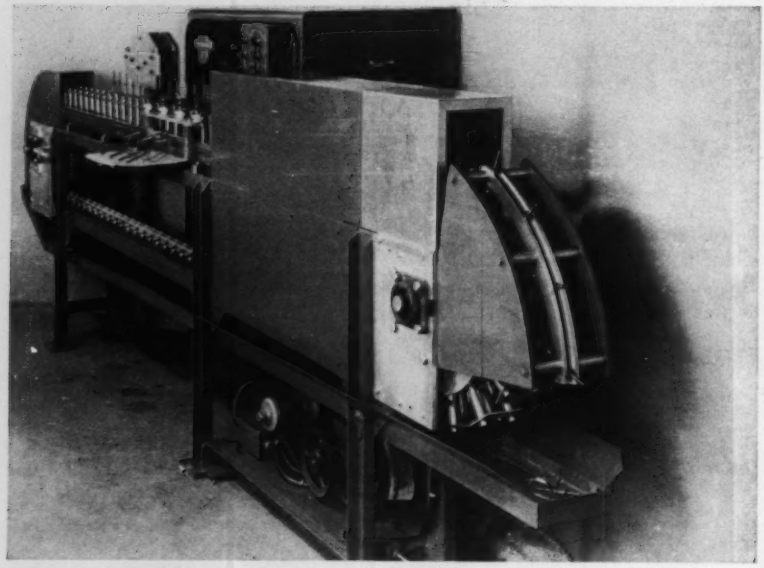
A WIDE variety of materials can be bonded by an adhesive that can be sprayed on in relatively dry form. It has high strength and resists heat. Only contact pressure is required.

The adhesive (3M's EC-1828) has a synthetic rubber base. It bonds polystyrene, sheet plastic, steel, aluminum, wood, particle board, and foamed glass. The company says low solvent content permits the application of the adhesive directly to polystyrene foam without causing any deterioration. Other applications include honeycomb sandwich panels and bonding of building panels and metal assemblies.

Parts coated with the materials can be assembled, positioned, and repositioned without the components adhering. After proper assembly, a momentary application of pressure with a nip roll will immediately bond the parts.

The adhesive maintains high strength over a service temperature range from −30 to 250° F and will satisfactorily meet MIL-P-8053B specification and six Forest Products Laboratory cycles.

For further information, *write* Adhesive Coatings & Sealers Div., Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.



Brazing Assembly Unit Ups Production

AN INCREASED production rate and reduced manpower requirements are advantages of an automatic beater, brazing assembly unit designed by Ther-Monic.

The conveyorized system maintains production of 1200 completed units per hour, a considerable increase over previous methods, says the company. Only one operator is needed to handle the pushbutton controlled unit. No special skills or training are required to handle the loading and monitoring of the equipment. The conveyor mechanism is operated by a variable speed drive which makes it readily adaptable to other production requirements. The setup has a work station and a 20 kw induction generator.

For further information, *write* Induction Heating Corp., a subsidiary of Hathaway Instruments Inc., Brooklyn, N. Y.

Slide Table Attachment Aids in Production

A SLIDE TABLE developed by Willhammer Machine Products can be quickly attached to milling machines, drill presses, and other machine tools for production work. It can also be used as an auxiliary layout table.

Specifications: 4 x 14 in. table, 7/16 in. T-slot, 5½ in. table travel, 1 13/16 in. height, and a weight of 38 lb. The base is 4 x 11½ in. long with 8 in. of dovetail.

For further information, *write* Willhammer Machine Products, 801 McHenry Ave., Woodstock, Ill.

Lift Trucks Maneuverable Under Heavy Loads

HIGH maneuverability and stamina while handling heavy loads are advantages cited for heavy duty, electric, fork lift trucks in the Spartan F-52T series.

Capacities are 10,000 and 12,000 lb. The drive axle, trail axle, frame, and other components of both in the series are designed to handle 12,000 lb loads. Minor modifications are made when the truck rating is reduced to 10,000 lb, the maker says.

Each model is capable of traveling 5 to 6 mph with lift speeds up to 32 fpm under full load. Designed for 36, 48, or 60 volt power supply, each truck has a large compartment that will accommodate a 1280 AH battery.

Maintenance features include a demountable electrical control panel, a unitized hydraulic control panel,

Don't Price Yourself Out of the PLUS Features You Get with SQUARE D CONTROL CENTERS

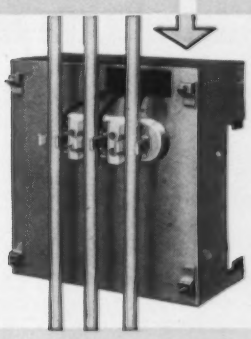
Industrial construction
All outer surfaces and structural parts are 12 gauge steel. Corner channels, cross members and doors are *formed* on special dies for maximum rigidity. Rust-resisting finish—phosphatized plus *baked* enamel.

Saves space
Unit heights in *3-inch* increments—an exclusive Square D advantage which permits use of units with minimum heights, eliminates the wasted space typical of modular systems.

Built-in safety
Units are metal-enclosed to confine damage should a fault occur. Unit side plates are permanently attached—can't be accidentally discarded. Switch-type units have visible blade disconnects for added safety.

Extra control flexibility
A variety of removable panels accommodates up to four oil-tight push buttons and pilot lights.

Tubular vertical buses
Another Square D "exclusive"—inherently stronger—greater cooling surface. Extra-wide spacing between phases gives added "breakdown" protection. Plug-in stabs are silver-plated copper backed by steel springs—give high pressure low resistance contact at all times.



Liberal wiring space
Wiring channels are *large and accessible*. No wire fishing through narrow passageways—wires can be laid in position—less costly installation.

GET THE COMPLETE STORY

BULLETIN SM-244 gives detailed information on all of the "plus" advantages you get when you specify Square D motor control centers. Send for a copy. Square D Company, 4041 North Richards St., Milwaukee 12, Wis.

SQUARE D COMPANY

wherever electricity is distributed and controlled

and direct access to motors, pumps, and other components through the floor of the operator's compartment. Sectionalized hydraulic control valves permit the addition of controls for extra attachments. Power steering, a wheel position indicator, and an engine hour meter are standard features.

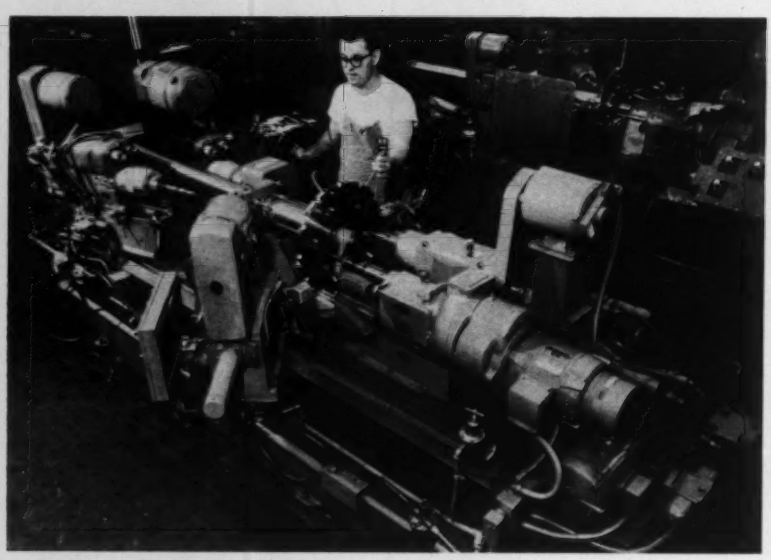
For further information, *write* Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.

Machine Reduces Cost Of Formed Stampings

DESIGNED to reduce the cost of formed stampings, the U. S. Model MS-28-HS Multi-Slide can attain outputs of 400 strokes per minute. The unit has symmetrical design. Die heads are reversible and can be used from either front or back.

Standard equipment includes one complete die head with cam, back plate, tiebar, four high speed forming slides with cams, stripper mechanism with cam, high speed, positive grip type feed, stock check, stock straightener, brake, automatic lubrication system, and a 5 hp variable speed drive with outputs from 80 to 400 strokes per minute. Special narrow die heads are available. The company says existing tooling for the standard No. 28 symmetrical Multi-Slide can be used in the MS-28-HS without change.

For further information, *write* U. S. Tool Co. Inc., Ampere Station, East Orange, N. J.



Unit Drills, Reams, Bores Jet Parts

THIS PRECISION machine drills, reams, and bores more than 40 holes in a turbineshaft for the JT3D turbofan jet engine. In developing the unit, Pratt & Whitney used the bed pattern from a machine that had been built to drill holes in the engine shaft. Re-using the 10 ft bed pattern saved on foundry costs. The division did all the machining and precision scraping on the raw castings and components. The drilling heads are stock items.

The machine first drills and bores 12 holes in the flange, drills and reams another 12 holes, and then drills, reams, and taps still another 12 holes. Eight angular holes are also drilled in the shaft journal. The company says the entire operation takes 1 hour 40 minutes, a substantial saving in time over alternate methods. It's claimed that the 9/16 in. holes in the shaft do not vary more than 0.001 in. from true position.

Another innovation: The index plate is bolted directly on the flange of the part, then positioned with a pin. By using the direct plate-flange combination, the enginemaker achieves machine accuracy.

For further information, *write* Pratt & Whitney Aircraft Div., United Aircraft Corp., East Hartford 8, Conn.

Permanent Magnet Chuck Has High Holding Power

SMALL, thin work (from 0.001 in.) can be ground with Brown & Sharpe's 6 by 18 permanent magnet chuck. The chuck (Micro-Mesh) has a closely spaced pole arrangement using barium-ferrite magnets.

In tests, thickness gage stock $2\frac{1}{2}$ in. long by $\frac{3}{8}$ in. wide was ground to 0.0008 in. thickness on a surface grinder with $\frac{1}{8}$ in. of the wheel cutting 0.0001 in. per pass.

Sliding tests on the chuck show a holding power of $2\frac{1}{2}$ psi for a piece 0.008 in. thick (about 250 per cent more power than conventional types, says the manufacturer).

Because holding power over the entire magnetic surface is uniform, the chuck can be used fully loaded for maximum production. The usual weak zone in the handle area has been eliminated by locating the handle shaft support mechanism on the chuck exterior. Over-all width including lever is 9 1/16 in.

For further information, *write* Industrial Products Div., Brown & Sharpe Mfg. Co., 250 Promenade St., Providence 1, R. I.

Billet Grinding Wheels Pare Metal Removal Costs

TEST results indicate that two lines of heavy duty billet wheels are capable of reducing the cost per pound of metal removed by 12 to 29 per cent, says Carborundum Co.

The wheels are hot and cold pressed types. They're designed principally for grinding stainless and other special alloy steels. The line

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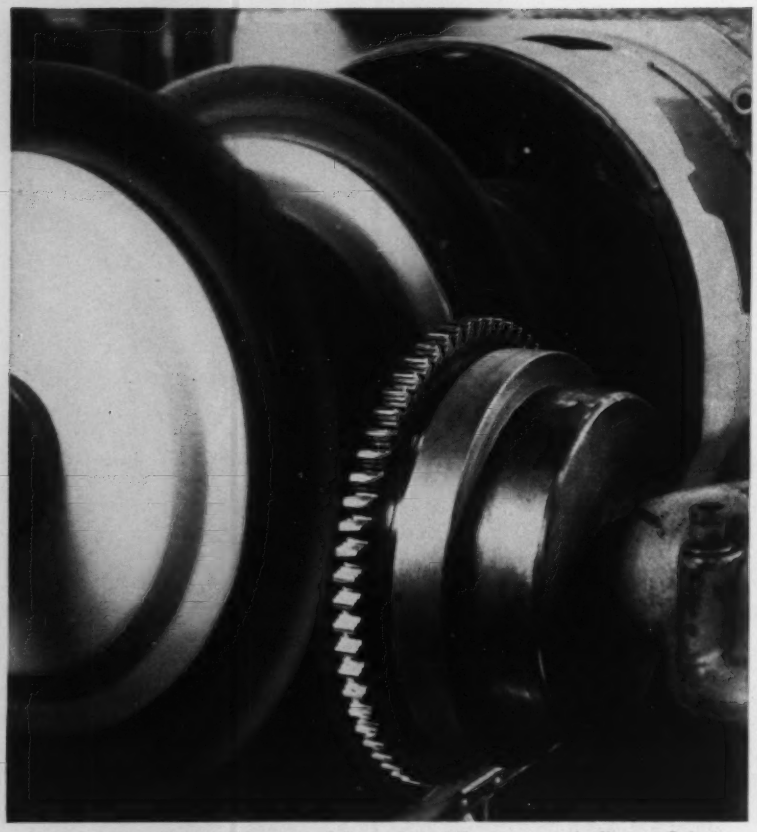


GAS TURBINE DISC DOVETAILS are deburred rapidly, automatically on Osborn 3A Finishing Machine using Osborn 14" Tufmatic® power brushes. Cycle time—floor to floor: 5 minutes . . . *9 times faster than former method.*

COST CUT 90% deburring
with OSBORN power brushing

Before: deburring the 64 dovetails broached on this gas turbine disc was a problem for this major producer of jet engine components. Off-hand filing was slow and costly . . . took 45 minutes per part . . . cost about $5.00 per disc.

Now: an Osborn 3A Finishing Machine—equipped with two Osborn Tufmatic® power brushes—deburrs the part automatically in just 5 minutes . . . *9 times faster.* Finishing cost is down to 50¢ per part . . . *a 90% cost reduction.* And production quality is consistently higher, more uniform.

Osborn power brushes and advanced brushing methods can help *you* same time and money on metal finishing operations of every description —deburring, cleaning, polishing, precision blending. An **O**sborn **B**rushing **A**nalysis—made at no obligation in your plant now—is the first step to savings like these. Write or call *The Osborn Manufacturing Company, Dept. S-38, Cleveland 14, Ohio. Phone ENdicott 1-1900.*

OSBORN

Metal Finishing Machines . . . and Finishing Methods
Power, Paint and Maintenance Brushes • Foundry Production Machinery

of hot pressed wheels can be used with the high speed heads which operate at 12,500 sfpm. The company says the cold pressed wheels not only give good performance on swing frame grinders, but have produced up to 20 per cent per pound cost reduction on stainless steel billets being processed on mechanical grinders at 9500 sfpm under 450 lb head pressure.

For further information, *write* Bonded Abrasives Div., Carborundum Co., Niagara Falls, N. Y.

Lift Truck Moves In Aisles Down to 6 ft Wide

A NARROW aisle type lift truck enables users to shrink aisles down to 6 ft. The lift truck (Model VST) was designed to provide safety, easy handling, and operator acceptance. A single operating lever replaces the usual control cluster. The Quadtrol control handle combines three speeds forward and reverse plus lifting and lowering of the forks. It makes possible full control of the truck and load at all times. Lift and travel functions can be controlled simultaneously.

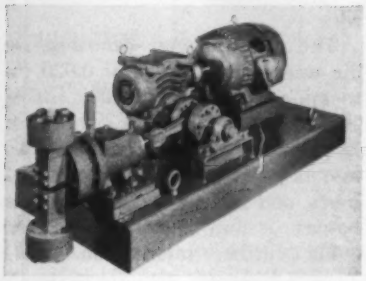
Controls are electrically interlocked to prevent starting or reversing in any but the first speed position. The unit is available in 2000, 3000, and 4000 lb capacities with lifting heights and straddle

arm spread to suit all applications.

For further information, *write* Automatic Transportation Co., a division of Yale & Towne Mfg. Co., 149 W. 87th St., Chicago 20, Ill.

Pump Moves Corrosives At High Pressures

CORROSIVE slurries at pressures up to 3000 psi can be handled by the Kemlon Model 150-7 pump. It uses a barrier diaphragm to separate working parts from the fluid being pumped. An actuating fluid is employed between the piston and diaphragm (no mechanical linkage). Pump surfaces in contact with corrosive media are made of Teflon and inert metals.



Valves are sealed by spring loaded guided cones on hardened edges. Self-cleaning action that results helps assure reliable seating of the valves, the maker says. The hydraulic system is equipped with a safety valve. Among other important features are a cast steel housing (water cooled) for high temperature and high pressure service, prelubricated antifriction bearings, adjustable stroke for variable volume, and positive metering over a wide pressure range. You can get capacities from 1½ to 6 gallons per minute.

For further information, *write* Keystone Engineering Co., P. O. Box 14366, Houston 21, Tex.

Oxygen-Fuel Gas Gouging Nozzles Make Fast Starts

TWO piece gouging nozzles designed for use with natural gas and propane have been introduced by Linde. Producing greater preheat than heretofore possible with those gases, the nozzles are said to be

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Covered by U.S. Patents

Do your high alloy castings show a tendency to sag at 1800 to 2200°F? Is the operation important enough to use an alloy that stays firm at that temperature range?

Then HOM is your casting requirement. It would take an unusually heavy load to deform this metal. It was developed by Duraloy metallurgists to be usable over that high temperature range—another milestone in the ever broadening services available to industry through Duraloy.

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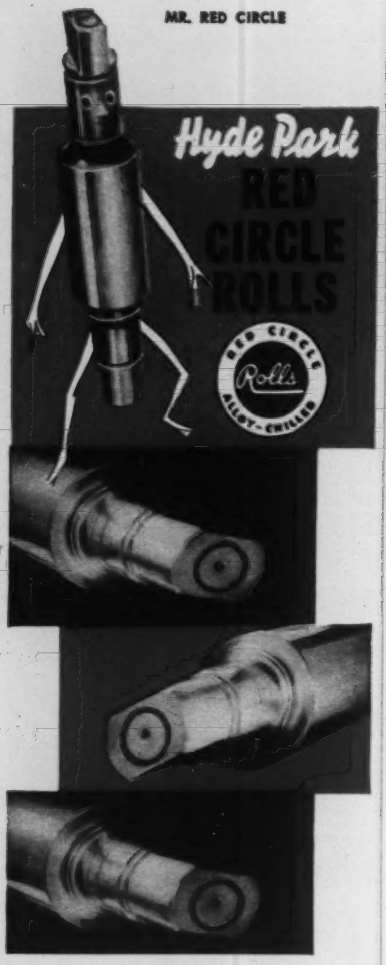

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ideal for gouging heavily scaled or rusted plates, or castings with sand incrustations. Gouging starts have been obtained in 4 seconds with the nozzle.

Design of the unit (Oxweld 1542 series) incorporates a slotted internal nozzle with an external sleeve. Slotted design provides a greater number of individual small flames with high gas velocity which combine to produce a high intensity flame. Stability prevents the high velocity, preheat flames from blowing off.

Internal surfaces of the copper external sleeve and brass internal section are chrome plated for corrosion resistance and long service life. Bent or straight nozzles are available.

For further information, *write* Linde Co., a division of Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

Lead Screw Unit Ups Production, Part Quality

AN ELECTROMECHANICAL lead screw unit (for drilling, boring, reaming, counterboring, spotfacing, chamfering, milling, and trepanning) is designed to feed against a common stop and provide adjustable tool dwell. The recirculating ball type mechanism provides higher production rates, decreased maintenance, and improved product quality, says the manufacturer.

Spindle drive, rapid traverse and feed are provided by separate motors. The rapid traverse motor drives the lead screw — the feed motor drives a recirculating ball nut. An adjustable torque brake permits feeding against a positive stop through controlled slip. The brake can be calibrated to slip at a preset overload to guard machine, tools, and workpiece against damage. Standard rapid traverse rate is 280 ipm.

For further information, *write* Foote-Burt Co., 13000 St. Clair Ave., Cleveland 8, Ohio.

Sharpening by Microscope Increases Die Life

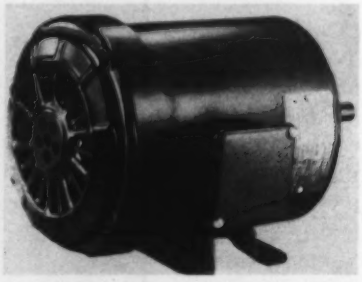
INCREASED die life and reduced production costs are advantages of a Die-Wear microscope that can quickly determine the exact amount of metal that must be ground to properly resharpen the cutting edge.

The compact unit can measure die wear over a range of 0.020 in. to an accuracy of ± 0.0005 in. or 10 per cent of the depth (whichever is greater). The instrument can also be used for measuring bevels, burrs, and fillets. It's available for battery or line power operations.

For further information, *write* Bausch & Lomb Inc., Rochester 2, N. Y.

Motors for Dirty Areas Enclosed, Fan Cooled

TOTALLY enclosed, fan cooled motors have been added to GE's Form G fractional horsepower line. The line is suited for applications where dust or dirt is prevalent, says the manufacturer. The design is dusttight. An outboard fan directs an air stream over the motor to cool it. Versions include motors with resilient bases for quieter operation and others with NEMA 56C end mountings. Most of the TEFC



models have bases that are welded on for accurate shaft alignment (required on many machine tools).

For shaft mounted fans and blowers, motors are provided with resilient bases or rings, extended through bolts for optional mounting, and extended oilers to make lubrication easy.

Available in ratings from $\frac{1}{8}$ to 1 hp in NEMA 56 frame size, the line meets NEMA standards in capacitor start and polyphase single speed and split phase single and two speed designs. All angle sleeve or ball bearings are optional on many models.

For further information, *write* General Electric Co., Schenectady 5, N. Y.

Oil Diffusion Vacuum Pump Evacuates Chambers Fast

FAST, CLEAN evacuation of large chambers is possible with a 32 in. diameter, oil diffusion vacuum pump announced by Consolidated Vacuum Corp. The pump (Type PMC-50000) provides a plateau speed of 52,000 liters per second throughout the 3×10^{-5} to 4×10^{-4} mm Hg pressure range. It has a baffled, ultimated pressure of 2×10^{-9} mm Hg and a low backstreaming rate of only 0.194 mg/cm²/hr.

For further information, *write* Consolidated Vacuum Corp., 1775 Mt. Read Blvd., Rochester, N. Y.

Transfer Press Produces Deep Drawn Parts Fast

PRODUCTION of deep drawn, brass parts at rates up to 90 per minute is claimed for Baird's Model 5L transfer press.

With a rated working pressure of 40 tons and a standard ram stroke of 7 in. the press offers a maximum depth of draw up to 3 in. and working die space of 51 in.

You can choose between 9, 10, 11, 12 or 14 station die sets. The maximum blank diameter of the 9 station die set is $3\frac{1}{2}$ in.—$2\frac{1}{4}$ in. for the 14 station die set.

For further information, *write* Baird Machinery Co., 1700 Stratford Ave., Stratford, Conn.

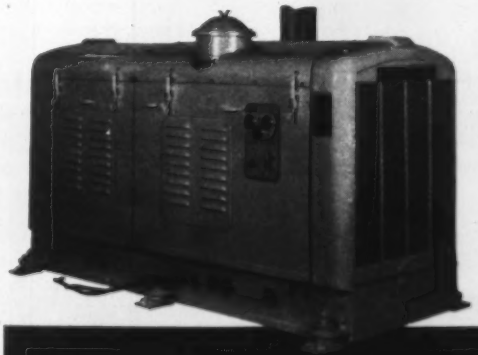
New! GM Series Heavy-Duty Diesel Electric READY-POWER UNITS

FOR LARGE ELECTRIC TRUCKS FROM 15,000 TO 80,000 LBS.

Now Ready-Power offers a new series of heavy-duty power units designed around GM diesel engine models 471, 371 and 353. Field reports indicate that the new units operate at exceptionally low ton-mile costs and are virtually maintenance free even after thousands of hours of operation under hard work conditions.

Complete "power package" features include variable voltage control which provides full range of tractive power at constant engine speed, and continuous hydraulic power without need for intermediate electric motors. Units are designed for maximum simplicity, utility and long life.

In addition to the GM series units designed for trucks from 15,000 to 80,000 lbs., Ready-Power produces a complete range of gas, LPG and diesel electric power units for electric trucks of all sizes, from walkies to 200,000 lb. capacities.

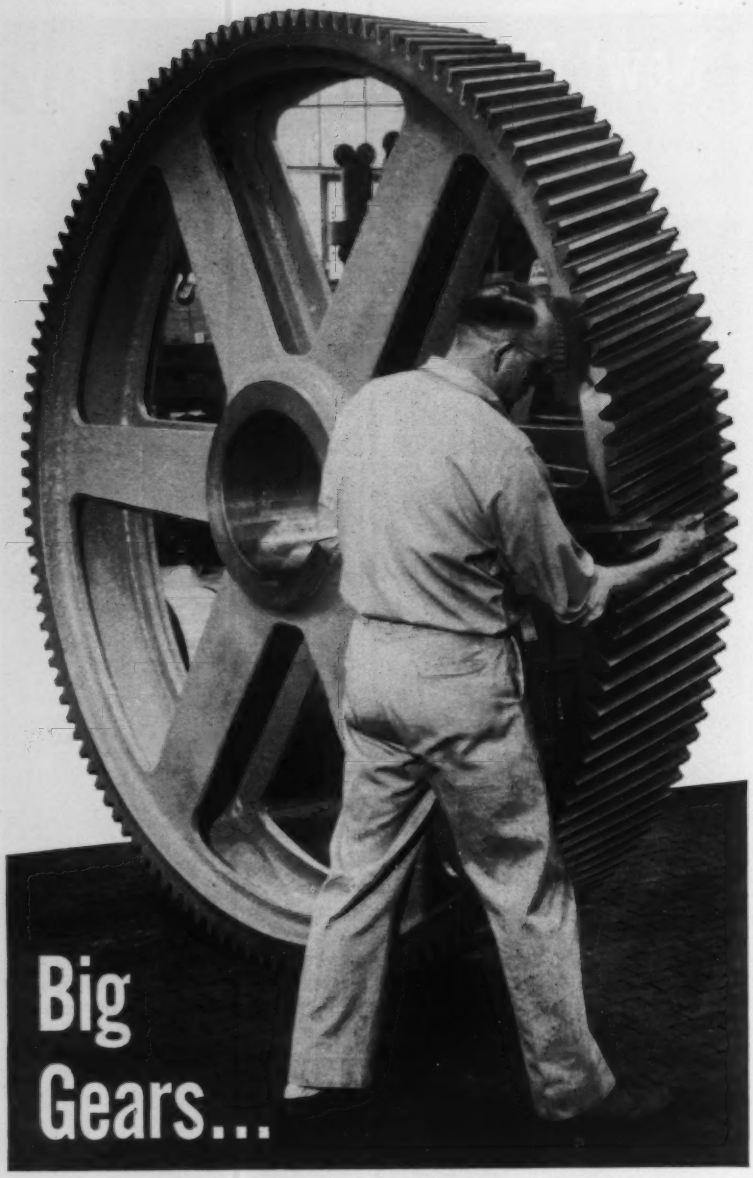


New Economy
New Simplicity
New Flexibility
Low Maintenance

Get complete information on GM diesel series units in Bulletin "GM"

READY-POWER

The READY-POWER Co., 3824 GRAND RIVER AVE., DETROIT 8, MICH.



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Cleaning for Electroplating

The cleaning and preparation of steel for electroplating is discussed in an eight page booklet. Oakite Products Inc., 134E Rector St., New York 6, N. Y.

Ceramic Tooling

Three bulletins present information on different aspects of ceramic tooling. Bulletin 61.1 discusses techniques and application information. Bulletin 61.2 discusses ceramic machining of hardened and heat treated steels. Bulletin 61.3 describes ceramic tooling for cast iron and other abrasive materials. Vascoloy-Ramet Corp., Waukegan, Ill.

Electrolytic Manganese

Use of manganese in steel, aluminum, and other nonferrous metals is detailed in an eight page pamphlet. It includes a section on physical and chemical properties. Foote Mineral Co., 18 W. Chelten Ave., Philadelphia 44, Pa.

Industrial Locomotives

A technical report discusses the selection of industrial locomotives. Plymouth Locomotive Works, Plymouth, Ohio.

Welding Tips

Instructions and welding tips for the repair and rebuilding of worn parts are offered in a 16 page booklet. Typical applications are dipper teeth, tractor grouser bars, and crusher parts. Dept. A, American Manganese Steel Div., American Brake Shoe Co., 389 E. 14th St., Chicago Heights, Ill.

High Vacuum Vapor Pumps

Considerable information about high vacuums is presented in a 54-page bulletin. One section is devoted to pump selection. Examples and details are given. Consolidated Vacuum Corp., 1775 Mt. Read Blvd., Rochester 3, N. Y.

NEW BOOK

Engineered Castings, Glenn J. Cook, McGraw-Hill Book Co. Inc., 330 W. 42nd St., New York 36, N. Y., 240 pages, $8.50

This guide for users and buyers of castings is suitable for design engineers and foundry personnel having duties in marketing, manufacturing, and engineering. Rise of castings is emphasized. Detailed are: Sand molding, shell molding, investment casting, diecasting, inspection and testing, vacuum casting, materials, casting designs and tolerances, and foundry selection. Included are an extensive bibliography on foundry topics, tables of physical properties, tolerances, and casting design pointers.

NOW . . . A ONE-COAT FINISH FOR EXTERIOR ELECTRICAL CLOSURES

Cut paint/bake time in half with new SUPER NUBELITE® thermosetting acrylic finish

June 27, 1961—The Glidden Company announces a new one-coat finish for electrical enclosures with the weather-resisting properties of traditional two-coat systems.

This newest in the family of Glidden one-coat SUPER NUBELITE finishes has just passed the stringent tests of a leading independent testing institution and is approved for suitable exterior electrical applications.

The battery of tests included salt spray, ultra-violet light and water, moist carbon dioxide-sulphur dioxide and moist hydrogen sulphide—all proving the durability of SUPER NUBELITE.

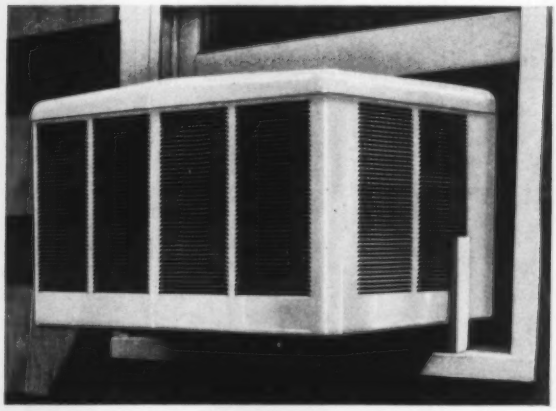
SUPER NUBELITE is applied in a film thickness of 1.5 mils and can attain theoretical coverage of 700 square feet per gallon per mil.

Other one-coat SUPER NUBELITE finishes are already in production on refrigerators, freezers and fluorescent light fixtures. Two-coat SUPER NUBELITE is now being used on clothes washers, dryers and other electrical appliances.

For complete information on one-coat SUPER NUBELITE finishes, call your Glidden representative or write direct.

Key to approval by leading independent testing institution was salt spray test. Above panel, coated with one-coat SUPER NUBELITE shows creepage of less than 1/16 inch along scribes after 2208 hours exposure.

Air conditioners and other exterior electrical enclosures can be finished with SUPER NUBELITE for superior weather protection at one-coat economy.



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INLAND STEEL IS HERE

Here . . . is a broad and vigorous territory—taking in almost all of Texas, all of Alabama, Louisiana and Mississippi, the western third of Georgia and the southern part of Arkansas.

In Texas, ever-busy steel fabricators build huge refineries, storage facilities and equipment for the oil and petrochemical industries—set the stage for hundreds of supporting industries. In Louisiana, home of the Mardi Gras and Dixieland Jazz, 5,000 miles of navigable waters spawn great shipbuilding enterprises and the great seaport of New Orleans. In Georgia, vast deposits of marble, clay and limestone exist, and here is Atlanta, largest manufacturing city in the Deep South. Alabama offers tremendous coal fields, great textile, furniture, pulp and paper and many other important industries. And in Mississippi, King Cotton rules while sugar, lumber, natural gas, oil, marl, cement rock and light manufacturing add millions to the state's rich income.

In the brief time Inland has been in the area, many steel consumers have already learned that Inland's reputation for fast service and dependability, is second to none. And everywhere, as a major producer of wide flange beams, standard structurals, bearing piles, sheets and bars, Inland is swiftly becoming well-known not only for the quality of its products, but for immediate answers to inquiries and amazingly fast service.

One of a series depicting market areas served by Inland · Art by Franklin McMahon

Inland, too, has liked what it has seen—the land and its people. Liked it so well that already it has expanded its service facilities to include not only its District Office at Houston, but resident representatives at Dallas and New Orleans. Located strategically on the Great Lakes and the rivers leading directly into the mighty Mississippi River, Inland can quickly pool-barge loads to Houston, New Orleans, Vicksburg, Greenville, Guntersville and Memphis for year 'round distribution from these points.

Already Inland has come to know the steel needs of cities like Birmingham, Dallas, Fort Worth, Houston, Atlanta, New Orleans, Jackson, Greenville and Shreveport. And for Inland, "knowing" is an essential part of serving.

In this territory of exciting growth and industrial expansion, Inland too, sees a land of opportunity —sees a future unlimited. Yes, Inland is *here*, and here to stay.

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and EVERYBODY GETS BEHIND THEM at Acme-Newport

Demand *Red Circle Service* for filling the low spots that occasionally appear in your inventories. Acme-Newport clearly marks your rush orders with a bright red circle that gains preferential handling in every department. Modern equipment, flexibility of scheduling and splendid employee cooperation combine to speed your orders through the mill, while maintaining every quality control for which Acme-Newport is recognized in all its steelmaking. If you need it yesterday, call us today, and it will be shipped surprisingly soon!

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- Hot Rolled Sheets
- Hot Rolled Pickled Sheets
- Cold Rolled Steel in Coil (*full hard only*)
- Cold Rolled Sheets
- Alloy Sheets and Plates
- Plates (3/16" *and lighter*)
- Electrical Sheets
- Electric Weld Line Pipe
- Spiral Welded Pipe

Acme-Newport Steel COMPANY

NEWPORT, KENTUCKY

A SUBSIDIARY OF ACME STEEL COMPANY

Steel Demand to Accelerate

BARRING a strike in the automotive industry, steelmakers look for a sharp upturn in demand for their products next month.

They're moderately encouraged by the way business has held up the last six weeks—a period when vacations and model changovers reduced steel consumption and orders for tin plate fell short of expectations.

In the weeks ahead, they expect steel demand to accelerate—gradually until mid-September and then faster. Higher auto production will give the uptrend most of its impetus. The automakers are tentatively planning to build 500,000 cars in September (vs. 180,000 this month). But other factors will contribute: 1. Construction activity will be on a postvacation upswing. 2. Tin plate shipments should increase as canners pack bumper crops of peas and tomatoes. 3. Appliance and furniture manufacturers will be ordering steel for their new lines. 4. And there's a possibility that some buyers will increase their inventories because they expect steel prices to go up in October.

WHERE ARE THE ORDERS?— Steelmakers in Pittsburgh, though optimistic, wonder why the auto companies aren't placing bigger orders for September if they really intend to build 500,000 cars next month. At some mills, September releases are only slightly larger than August's. The only explanation some sales executives can offer is that buyers are deliberately holding back until labor negotiations are settled and there's no danger of a strike. In Chicago, steelmakers have more orders in hand for September than they had for August a month ago, but the improvement they've seen doesn't reflect any pickup in automotive demand.

UPTURN FOR SHIPMENTS— Although they're puzzled by the slowness of automotive ordering, steelmakers still expect August shipments to top July's. What's more, they expect September shipments to be at least 10 per cent higher than August's. There's no evidence yet that buyers are hedging against the possibility of a price hike.

MARKET LINEUP CHANGES— Auto production during the first half of 1961—2,736,717 cars—was off 26.3 per cent from the 3,809,494 built in the corresponding period of 1960. Result: A shift in the lineup of major steel markets. Warehouses and distributors moved into first place, taking 18.5 per cent of industry shipments. The automotive industry dropped to second, with 17.8 per cent of the tonnage. In the first half of 1960, the order was reversed.

IMPACT ON INVENTORIES— Total shipments of the steel industry in the first half were 31,227,998 tons. Subtracting exports of 771,016 tons and adding imports of about 1,275,000 tons, market analysts figure that domestic consumers received 31.7 million tons. They consumed an estimated 33 million tons, thereby reducing their inventories by 1.3 million tons. Almost all the liquidation was in the first quarter. During the June quarter, receipts and consumption were balanced at about 17.7 million tons each. Third quarter consumption will be about the same as the second quarter's, but shipments may be slightly higher. Inventories may rise by about 500,000 tons.

PRODUCTION HOLDS— Look for ingot production in the week ending Aug. 19 to be about the same as the 1,890,000 tons of ingots that STEEL estimates the industry poured in the week ended Aug. 12. Output then was 2.2 per cent above the previous week's.

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Rivetmaker to Quote Net Prices

NET PRICING will be introduced in the tubular and split rivet industry this fall by the Tubular Rivet & Stud Co., Quincy, Mass.

The system will replace the list price and discount method now used by TRS and other members of the industry.

TRS is adopting the method so purchasing agents, designers, and engineers can easily and speedily ascertain prices.

The need for simplicity in pricing was evident from requests for price quotations although buyers could do it themselves from a list price catalog and discount sheet, says Raymond F. Duffy, vice president-sales, TRS. "It was also evident from remarks by purchasing agents and engineers," he adds.

"List price catalogs were in their files, but they were not being used for pricing," Mr. Duffy explains. It was easier for customers to ask for quotations than to figure them out, TRS concluded.

• **Buyers Polled**—In studying the problem, TRS mailed 1400 questionnaires to sound out buyers, designers, and engineers on their preferences—net pricing vs. list pricing and discounts.

The response was high — about 50 per cent of the 1400 people replied.

Seventy per cent of the respondents said they would prefer a net price catalog. Some made such remarks as: "Excellent idea"; "savings of considerable time and paperwork"; "we prefer net prices on all our purchases"; and "with automated purchase systems, the net price is a must."

Result: TRS will publish a net price catalog for tubular and split rivets and distribute it in early fall.

• **More Costly to Producers**—It will be more difficult and more expensive for a rivet producer to handle price changes with the net price catalog system than with the conventional list price and discount method. Under the conventional system, a change can be made merely by issuing a new discount sheet.

Steps in pricing tubular and split rivets

NEW METHOD

Using net price catalog of Tubular Rivet & Stud Co., Quincy, Mass.

1. Select pricing group covering the body and head diameters.
2. Select the net price and finish extra (for standard finishes) in that group for the length specified.
3. Add the two together to get the net price for base quantity.
4. Select the net extra from the quantity schedule and add to or subtract from the net rivet price for base quantity.

CONVENTIONAL METHOD

Using list price catalog and discount sheets

1. Same as No. 1 in new method.
2. Select the price and finish extra in pricing group for the length specified.
3. Select discount from supplementary sheet—according to the metal specified, the appropriate body diameter group, and the finish discount by type of rivet—tubular or split.
4. Apply the discounts, and separately compute the net price of the rivet, rounding off to the nearest penny, and the net finish extra, rounding off to the nearest penny.
5. Same as No. 3 in new method.
6. Same as No. 4 in new method.

Comments: Only simple addition or subtraction is required in the new method. The two steps in the conventional method (3 and 4) requiring calculations have been eliminated, also possible errors in rounding off to the nearest penny.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 186 & 187

Automakers are optimistic about their prospects for the 1961 model cleanup and strong demand for next year's cars, says the top sales executive of a Pittsburgh steel company. Just back from Detroit, he expects the car companies to buy relatively little steel this month to boost their purchases substantially in September.

The consensus among sheet producers is that August shipments will top July's but won't reach June's. September shipments should be at least 10 per cent higher than August's. There's no evidence that buyers are hedging against the possibility of a price hike in October. Since delivery promises are unchanged, users are keeping their inventories low and depending on the mills for fast service.

Galvanized sheets continue to pace the market. Most producers are running close to capacity and quoting extended deliveries. Although demand from farmers and air conditioner manufacturers is declining seasonally, automotive requirements will sustain the market in the fall and may push industry shipments to a record.

Sheet deliveries range from two to five weeks on cold rolled, two to three weeks on hot rolled, and well into October on galvanized, although promises on heavier gages are not as extended as they are on the lighter gages.

Service centers in several districts have reduced prices on galvanized sheets. That is surprising to many in the industry because major customers of the distributors are also good customers of the mills. The fact that service centers also sell to the small metal shops is part of the answer.

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Inland Steel Producing More Coiled Tin Plate

Inland Steel Co. completed the conversion of its No. 2 electrolytic tinning line at its Indiana Harbor, Ind., Works from flat sheets to coils. The company put it back into operation July 20. The line will be used exclusively for coil production while the No. 1 line will produce sheets only.

Adaptation of the line consisted of replacing shearing and piling equipment at the delivery end with tension reels and supporting equipment and installing a modern, mash seamwelder. Coil equipment is identical with that on the No. 3 line, completed last September. The No. 2 line can form coils up to 59 in. OD and as heavy as 25,000 lb. Monthly capacity is 11,000 tons against 14,000 tons for the No. 3 line.

Tin Plate . . .

Tin Plate Prices, Page 187

Demand for tin plate is starting to improve from an end use standpoint, producers report. Can companies expect the pea pack to be one of the largest in history; they point out that the tomato crop is coming along well. Higher consumption of cans hasn't triggered bigger releases of tin plate, but steel executives are confident that it soon will. Users have abnormally small inventories.

Canmakers are ordering all the thin tin plate (55 to 60 lb basis

weight) that they can get. More and more breweries are switching to the lightweight cans. Says a leading canmaker: "Before the season is out, we expect to be making a large majority of our beer containers from double reduced tin plate."

Plates . . .

Plate Prices, Page 185

Demand for specialties continues to feature the plate market. The chemical industry is ordering rather freely, and some sizable missile base work is being figured. In general, however, plate producers have little in the way of order backlogs and are able to offer deliveries of carbon plates in ten days to two weeks and alloy plates in five weeks.

Plate orders placed by New England shops in August will not surpass those placed in July by more than 5 per cent, although Naval shipyards are subcontracting more tonnage (Avery & Saul Co., Cambridge, Mass., is sharing in six contracts placed by the Portsmouth, N. H., submarine section).

Plate girder bridge tonnage is up slightly in New England. Industrial demand has slackened and is not expected to perk up until the fourth quarter.

Japan will ship 4500 tons of thin steel plates to Communist China. Four of Japan's leading steel firms accepted Peiping's offer. The plates will be delivered in September and October for $133.30 per ton, including freight and insurance charges.

Steel Bars . . .

Bar Prices, Page 185

A few weeks ago, hot rolled bar producers were confident that their August shipments would be much better than July's. Now they're not so sure. "We're still looking for some improvement," says a leading barmaker in Pittsburgh, "but shipments certainly won't be as good as we originally forecast. It's hard to pinpoint the reason, but reduced automotive demand is certainly a factor. Much of the steel that we ship to cold finishers, forgers, and fastener manufacturers gets to the auto companies eventually."

Orders from farm equipment

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Convenience, positive control and protection for the operator are provided by the pistol-grip, push-button control station of the Coffing Quik-Lift electric hoist.

Loads can be raised or lowered while pulling a trolley mounted hoist since a strain cable is incorporated in the control cord. The control station is made of non-conducting, impact resistant plastic and the 115 volts at the station plus the interlocked push buttons make for safe operation. The V-type brake assures positive control of loads. Housing is of strong but light aluminum which makes for portability.

Ask your distributor about the twenty JF models with capacities ranging from ¼ to 2 tons or write for Bulletin ADH-65BB.

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Ratchet Lever • Air
Hand Chain • Electric

DUFF-NORTON

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Hydraulic • Worm Gear

manufacturers have passed their seasonal peak. Other buyers are keeping their inventories low and gearing their purchases to consumption. Since mill deliveries are prompt and schedules are fluid, users have no incentive to order ahead. Although barmakers are forecasting higher shipments in September, early bookings for the month haven't shown any upturn.

While much depends on rolling schedules, rounds can be had within one to two weeks without too much difficulty. Special bar shapes range around three to four weeks.

Cold drawn carbon demand still lags. Munitions work hasn't stepped up, but some arsenal lists are expected out within a few weeks.

One New England integrated bar mill is resuming production after a vacation shutdown. Most producers in the district look for September to show at least a 10 per cent increase over July-August bookings. Prices on stainless bars are weak and erratic.

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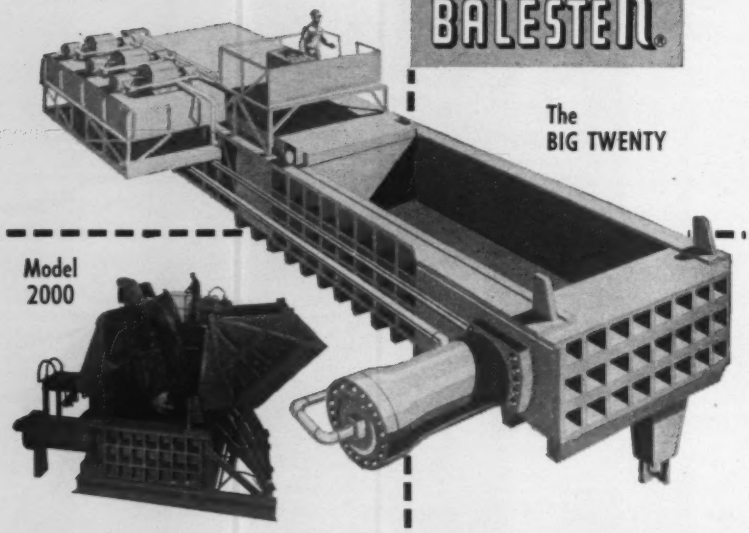
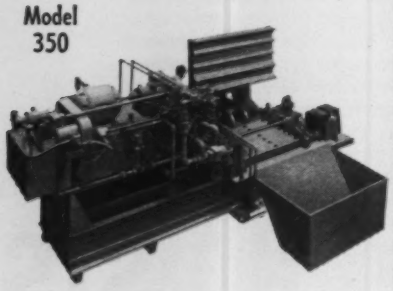


Model 2000



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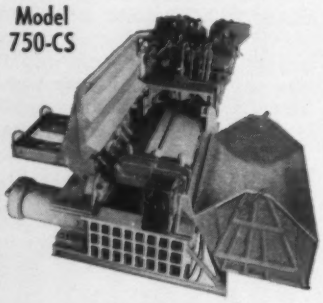

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Structural Shapes . . .

Structural Shape Prices, Page 185

The outlook for an increase in structural steel demand continues to provide encouragement. A number of projects (public and private) are being figured and a fair amount of work is being placed.

Bridge tonnage is heavier in New England. Several large contracts which were held up for weeks have been placed with fabricating shops; one at Providence, R. I., involved close to 3000 tons. Estimates also are in on the largest superstructure to come out this year in the district (22,250 tons, Fall River-Somerset, Mass.).

Fabricated structural business is still plagued by low prices, notably on wide flange and stringer work. Some shops are passing up estimates pending a stiffening in prices.

Some of the smaller fabricating shops in the Philadelphia area are strike bound. In New York City, fabricating shops and unions have adjusted differences, but drivers of concrete mix trucks are still holding up work.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3100 tons, cement plant, Ravena, N. Y., for Atlanta Cement Co., to Taylor & Gaskin, Detroit.

2500 tons, three, 5 span bridges, including two welded plate girder superstructures, Merrimack River, Haverhill, Mass., to Tower Iron Works, Providence, R. I. (600 tons) and American Bridge Div., U. S. Steel Corp., Pittsburgh (1900 tons); Campanella & Cardi Construction Co., Warwick, R. I., general contractor.

2500 tons, 21 story office building, Avenue of Americas at 46th Street, New York, through Rose Associates, general contractor, to Schacht Steel Construction Inc., that city.

2100 tons, eight, multiple span, steel stringer bridges, Chelmsford-Lowell-Tewksbury, Mass., Tower Iron Works, Providence, R. I.; M. DeMatteo Construction Co., Quincy, Mass., general contractor.

2000 tons, Bay Shore station Unit No. 3, Toledo Edison Co., Toledo, Ohio, to Whitehead & Kales, Detroit.

1200 tons, General Foods office building, White Plains, N. Y., to Grand Iron Works, New York.

1000 tons, Lily Tulip Cup manufacturing building, Holmdel, N. J., through K-Way Construction Corp., Flushing, L. I., to Ingalls Iron Works, Birmingham.

800 tons or more, Yellowtail Dam, Bureau of Reclamation, Hardin, Mont., to Pacific Car & Foundry Co., Seattle; Morrison-Knudsen Co., Boise, Idaho, and associates, general contractors.

500 tons, Laboratory No. 85, E. R. Squibb & Sons, New Brunswick, N. J., to Belmont Iron Works, Eddystone, Pa.

250 tons, plant extension, Du Pont interests, Seaford, Del., to American Bridge Div., U. S. Steel Corp., Pittsburgh.

250 tons, radar tower, Mt. Laguna, Calif., Air Force Base; to Electro Steel Structures Inc., and Western Erectors Inc., Rialto, Calif.

208 tons, Central Junior High School, Anchorage, Alaska, to Steel Fabricators Inc., Anchorage; C&R Builders, Seattle, general contractor at $1,750,000.

153 tons, channels, Military Industrial Supply,

Navy, Philadelphia, to Caine Steel Co., Philadelphia.

140 tons, state highway bridge, Wyoming County, Pennsylvania, through Reed & Kuhn, Elysburg, Pa., general contractor, to High-Welding Co., Lancaster, Pa.

140 tons, addition, Du Pont plant, Dunbarton, S.C., to Carolina Steel & Iron Co., Raleigh, N. C.

115 tons, Federal Street overpass, Pensauken, N. J., through F. A. Canuso, general contractor, to American Bridge Div., U. S. Steel Corp., Pittsburgh.

STRUCTURAL STEEL PENDING

22,250 tons, superstructure, bridge, Taunton River, Fall River-Somerset, Mass.; bids in direct on steel fabricating and erecting, Department of Public Works ,Boston.

20,000 tons, 50 story office building, 277 Park Ave., New York; Cauldwell-Wingate Co., 120 E. 21st St., that city, general contractor.

6100 tons, 345 kv towers, American Electric Power Service Corp., for erection in the vicinity of Anderson, Ind.; bids Aug. 20.

3800 tons, South West Freeway, Washington; bids closed Aug. 8.

2650 tons, Armistade Dam, Del Rio, Tex., for Texas & New Orleans Railroad; bids Aug. 16.

2000 tons, warehouse, Western Electric Co., King of Prussia, Pa.; pending.

2000 tons, transmission towers for American Electric Power Service Corp., for erection in Ohio; bids Aug. 15.

1715 tons, three state owned ferries; bids to Juneau, Alaska, Aug. 30.

1700 tons, Barnette Bank building, Jacksonville, Fla.; Williams E. Arnold Construction Co., that city, low on general contract.

1680 tons, state bridge work, FALIE 61-30, Suffolk County, New York; Lizza & Sons, Oyster Bay, N. Y., low on general contract.

1200 tons, including 150 tons of joists, high school, Locust Valley, N. Y.; Dominic Fortunate, general contractor.

1018 tons, office headquarters, National Maritime Union, 13th Street and Seventh Avenue, New York; J. Alexander Stein, that city, general contractor.

684 tons, state bridge work, FAHRD 51-1, New York County, New York; Horn Construction Co., Merrick, N. Y., low on general contract.

REINFORCING BARS . . .

REINFORCING BARS PLACED

3420 tons, Yellowtail Dam, Bureau of Reclamation, Hardin, Mont., to unstated interests; general contract to Morrison-Knudsen Co. and associates, Boise, Idaho.

690 tons, state labor and industry office building, Trenton, N. J., through Delli Co., general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

600 tons, apartment house, Atlantic City, N. J., to American Steel Engineering Co., Philadelphia.

505 tons, Pier 28, Port of Seattle, to Pacific Coast Div., Seattle, Bethlehem Steel Co.; Lease Co. Inc., that city, general contractor.

270 tons, Safeway store, Spokane, Wash., to Pacific Coast Div., Seattle, Bethlehem Steel Co.; Max Kuney Co., Spokane, general contractor.

167 tons, Washington state highway project, Yakima County, to Pacific Coast Div., Seattle, Bethlehem Steel Co.; Sound Sand & Gravel Co., Port Orchard, Wash., general contractor at $127,508.

162 tons, Willow Creek highway bridge, Alaska, to Pacific Coast Div., Seattle, Bethlehem Steel Co.; M-B Contractors, Seattle, general contractor.

120 tons, sewage treatment plant, Fairbanks, Alaska, to Pacific Coast Div., Seattle, Bethlehem Steel Co.; Reed & Martin, Fairbanks, general contractors.

105 tons, including 40 tons, steel piles, two wide flange beam bridges, Bridgewater, Vt., to Bethlehem Steel Co., Bethlehem, Pa.; W. W. Wyman Co., Greenfield, Mass., general contractor.

REINFORCING BARS PENDING

1000 tons (also gates, hoists, etc.), Clark Canyon Dam; bids to Bureau of Reclamation, Dillon, Mont., Aug. 24; Spec. DC 5634.

710 tons (also steel sheet piling, etc.), Barrett's Diversion Dam, Missouri River Basin; bids to Bureau of Reclamation, Dillion, Mont., Sept. 7.

270 tons (also sheet piling, etc.), French Slough Floor Control District, Snohomish County, Washington; bids Aug. 18.

225 tons, Idaho state highway structures, Bannock County; bids to Boise Aug. 15.

200 tons, Washington state highway bridge, Whitman County; bids Aug. 8.

185 tons, Idaho state road project, Canyon County; Rogers Construction Co., Portland.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Iran, 16 diesel-electric locomotives, to Electro-Motive Div., La Grange, Ill., General Motors Corp.; loan of $3.5 million by Export-Import Bank of Washington, to purchase equipment has been granted.

RAILROAD CARS PLACED

Canadian Pacific, 100, seventy ton covered hopper cars, to Marine Industries, Canada.

RAILROAD CARS PENDING

Southern Railway, two hundred, 100 ton aluminum covered hopper cars; bids asked.

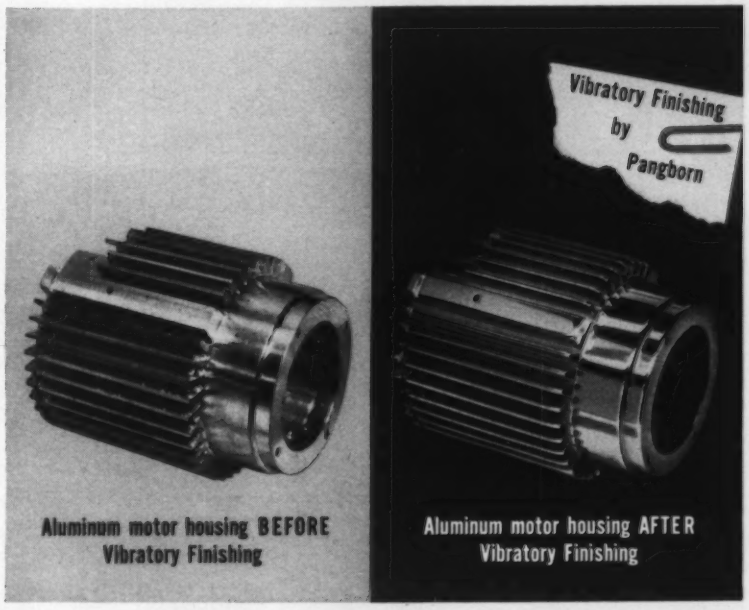
PLATES . . .

PLATES PLACED

272 tons, carbon hull plates, Military Industrial Supply, Navy, Philadelphia, to Caine Steel Co., Philadelphia.

245 tons, carbon hull plates, Military Industrial Supply, Navy, Philadelphia, to Carroll Steel Co. Inc., Woodbury, N. J.; also 65 tons, high tensile, to U. S. Steel Corp., Pittsburgh.

200 tons, carbon hull, Military Industrial Supply Navy, Philadelphia, to South Asia Corp., New York; also 250 tons, carbon sheets to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AMERICAN CANCER SOCIETY

Columbia-Geneva Steel Div., San Francisco, U. S. Steel Corp.

PLATES PENDING

3500 tons, three ferries, Alaska; bids to Juneau, Aug. 30; Phillip F. Spaulding & Associates, Seattle, naval architects.

1000 tons 48 in. water main, Woodhaven Boulevard, Queens, N. Y., Oak Hill Contracting Co., low on general contract.

400 tons, boiler plant building and facilities, Gaithersburg, Md.; Marcowitz Co., Atlanta, low on subcontract, through Paul Tishman, New York, general contractor.

139 tons, floor plates, Class I, Military Industrial Supply, Navy, Philadelphia; bids Aug. 11; also 293 tons, sheets, Type I, Class D; bids Aug. 14.

100 tons or more, 15,000 gallon, carbon, plastic lined, fuel catchment tanks, 11 different sites; bids Aug. 17, U. S. Engineer, New York.

100 tons, 5000 barrel, floating roof, jet fuel storage tank, Spokane International Airport, Wash.; bids Sept. 7, U. S. Engineer, Seattle.

Steel Ingot Output Rises To New High Since June

UPTURN in automotive steel buying and prospects of a defense build-up have brightened the outlook for the steelmaking industry. The operating rate has not been materially affected but sentiment has definitely improved. Steel ingot production for August undoubtedly will be better than that in July; September prospects appear even more promising. Ingot production for the week ended Aug. 12 is estimated by STEEL at 1,890,000 tons, a gain of 2.2 per cent over the previous week's total.

• **Youngstown**—Steelmaking operations here rose 4 points during the week ended Aug. 12 to 55 per cent of 1960 capacity. Youngstown Sheet & Tube Co. put on two open hearths at its Campbell (Ohio) Works and Sharon Steel Corp. added one at its Roemer Works, Farrell, Pa.

• **Buffalo**—Steel ingot production here rose to about 51.5 per cent of 1960 capacity during the week ended Aug. 12 from 46.5 per cent for the preceding week. Bethlehem Steel Co. relighted two more open hearth furnaces. Operations were not changed at two other district mills. Diversity continues to mark the local steel order situation; a wide variety of consumers are placing slightly larger orders.

• **Chicago**—The local steelmaking rate declined 1 point, to 69 per cent of 1960 capacity, in the week ended Aug. 12. It's expected to stay at that level much of this month.

• **Birmingham** — The steelmaking rate in the Birmingham-Gadsden-Atlanta district was slightly lower for the week ended Aug. 12 at about 66.5 per cent of 1960 capacity compared with 67 per cent for the preceding week. A district steelmaker is testing use of oxygen in its open hearth furnaces and may install oxygen facilities to increase efficiency.

• **Philadelphia**—A leveling off in steel output in the Northeast district is indicated for the week ended Aug. 12, following a jump of 8 points in the AISI index to 107 in the previous week. Steel buying is tending slowly upward and a quickening should develop soon. With the vacation season virtually over, auto labor negotiations seem to be the major factor in the steel production situation.

• **Los Angeles**—The steel operating rate in the Western district slipped 1 point during the week ended Aug. 12 to an estimated 77 per cent of 1960 capacity. A spotty pattern is reflected among leading mills.

• **Cleveland** — Production in this district is slowly climbing back to the 100,000 ton weekly level. For three weeks, output was below that figure and the lowest since last April.

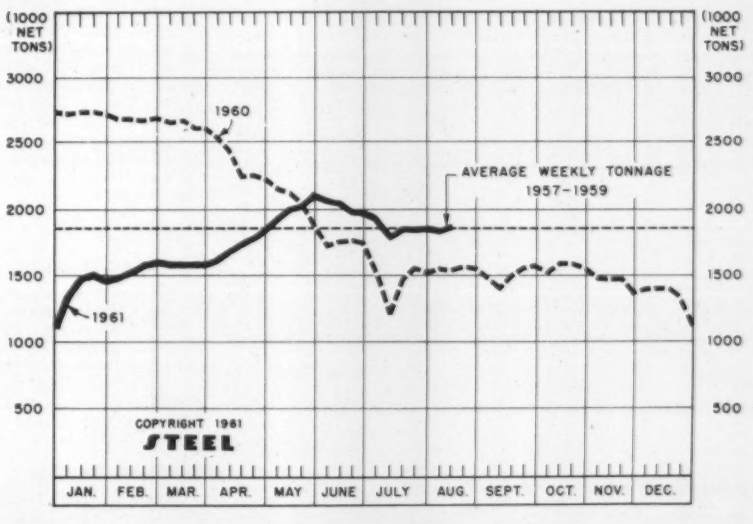
• **Pittsburgh**—District steelmaking operations averaged about 62 per cent of 1960 capacity in the week ended Aug. 12, a gain of 1 point from the previous week's rate. Production in the week ended Aug. 5 was 363,194 tons, the highest since that in the week ended June 24.

STEEL INGOT PRODUCTION

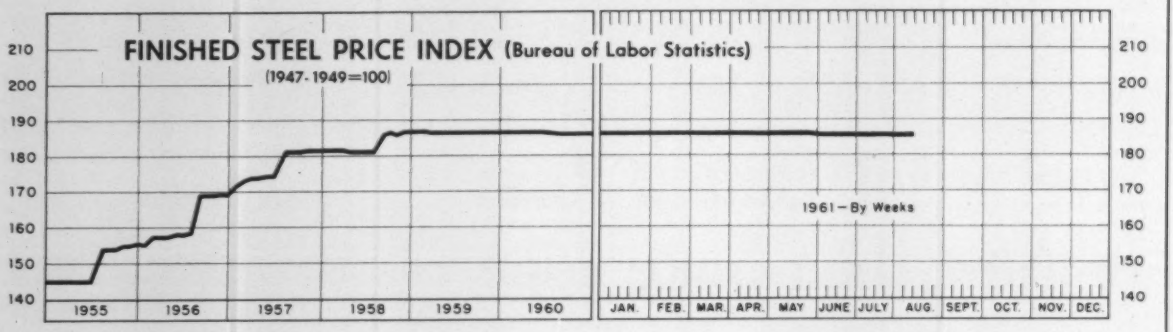
Weeks Ended	Net Tons	Change
Aug. 12	1,890,000*	+ 2.2%
Aug. 5	1,850,000	+ 1.8%
July 29	1,818,000	− 2.2%
Totals to Aug. 5		
1961	54,236,000	−19.9%
1960	67,672,000	

DISTRICT	Week Ended Aug. 5 Tons‡	Week Ended Aug. 5 Index†	Week Ended July 29 Index†
Northeastern	285,900	107	99
Buffalo	104,170	77	79
Pittsburgh	363,194	90	88
Youngstown	142,784	84	87
Cleveland	94,447	102	99
Detroit	107,015	102	96
Chicago	381,558	102	105
Cincinnati	82,191	109	116
St. Louis	60,433	115	110
Southern	117,068	108	105
Western	140,296	120	112
Industry	1,850,000	99.3	97.6

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Aug. 8, 1961	Week Ago	Month Ago	July Index	Year Ago
185.6	185.6	185.6	185.6	186.2

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Aug. 8

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	(N.A.)
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.643
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.225
Strip, C.R., Stainless, 430 (lb)	0.460
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.496
Pipe, Galv., Buttweld (100 ft)	23.098
Pipe Line (100 ft)	195.423
Casing, Oil Well, Carbon (100 ft)	193.028
Casing, Oil Well, Alloy (100 ft)	302.650
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (Bundles)	7.647
Nails, Wire, 8d Common	9.433
Wire, Barbed (80-rod spool)	8.372
Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Aug. 9 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg = 100)	247.82	247.82	247.82	247.82	210.45
Index in cents per lb	6.713	6.713	6.713	6.713	5.701

STEEL's ARITHMETICAL PRICE COMPOSITES

	Aug. 9 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$131.27
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	61.09
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	60.11
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	61.63
Steelmaking Scrap, GT	38.00	37.83	37.00	32.00	54.83

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Aug. 9 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	5.075
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	5.075
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.85
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	5.00
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	5.00
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.85
Plates, Chicago	5.30	5.30	5.30	5.30	4.85
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	5.25
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.85
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.75-5.85
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	6.30
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35-6.95
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	7.20
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	8.35
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.85

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$91.50
Wire rods, 7/32-5/8" Pitts.	6.40	6.40	6.40	6.40	5.80

PIG IRON, Gross Ton	Aug. 9 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$63.50
Basic, Valley	66.00	66.00	66.00	66.00	62.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	66.26
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	66.76
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	59.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	66.70
Malleable, Valley	66.50	66.50	66.50	66.50	63.00
Malleable, Chicago	66.50	66.50	66.50	66.50	63.00
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	215.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$35.50	$35.50	$35.50	$30.50	$55.50
No. 1 Heavy Melt, E. Pa.	40.00	40.00	39.00	34.00	54.00
No. 1 Heavy Melt, Chicago	38.50	38.00	36.50	31.50	50.00
No. 1 Heavy Melt, Valley	38.50	38.50	38.50	33.50	59.50
No. 1 Heavy Melt, Cleve.	35.50	35.50	35.50	31.50	56.50
No. 1 Heavy Melt, Buffalo	31.50	31.50	31.50	29.50	44.50
Rails, Rerolling, Chicago	58.50	58.50	58.50	53.50	73.50
No. 1 Cast, Chicago	42.50	42.50	41.50	42.50	49.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.50
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	17.50
Owen, Fdry., Milwaukee	32.00	32.00	32.00	32.00	29.50

Steel Prices

Mill base prices as reported to STEEL, Aug. 9, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 186; footnotes, page 188.

SEMIFINISHED

INGOTS, Carbon Forging (NT)
Munhall,Pa. U5 ..... $76.00

INGOT, Alloy (NT)
Detroit S41 ..... $82.00
Economy,Pa. B14 ..... 82.00
Farrell,Pa. S3 ..... 82.00
Lowellville,O. S3 ..... 82.00
Midland,Pa. C18 ..... 82.00
Munhall,Pa. U5 ..... 82.00
Sharon,Pa. S3 ..... 82.00

BILLETS, BLOOMS & SLABS Carbon Rolling (NT)
Bartonville,Ill. K4 ..... $82.00
Bessemer,Pa. U5 ..... 80.00
Buffalo R2 ..... 80.00
Clairton,Pa. U5 ..... 80.00
Ensley,Ala. T2 ..... 80.00
Fairfield,Ala. T2 ..... 80.00
Fontana,Calif. K1 ..... 90.50
Gary,Ind. U5 ..... 80.00
Johnstown,Pa. B2 ..... 80.00
Lackawanna,N.Y. B2 ..... 80.00
Munhall,Pa. U5 ..... 80.00
Owensboro,Ky. G8 ..... 80.00
S.Chicago,Ill. R2, U5 ..... 80.00
S.Duquesne,Pa. U5 ..... 80.00
Sterling,Ill. N15 ..... 80.00
Youngstown R2 ..... 80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ..... $99.50
Buffalo R2 ..... 99.50
Canton,O. R2 ..... 102.00
Clairton,Pa. U5 ..... 99.50
Conshohocken,Pa. A3 ..... 99.50
Ensley,Ala. T2 ..... 99.50
Fairfield,Ala. T2 ..... 99.50
Farrell,Pa. S3 ..... 99.50
Fontana,Calif. K1 ..... 109.00
Gary,Ind. U5 ..... 99.50
Geneva,Utah C11 ..... 99.50
Houston S5 ..... 104.50
Johnstown,Pa. B2 ..... 99.50
Lackawanna,N.Y. B2 ..... 99.50
LosAngeles B3 ..... 109.00
Midland,Pa. C18 ..... 99.50
Munhall,Pa. U5 ..... 99.50
Owensboro,Ky. C8 ..... 99.50
Seattle B3 ..... 109.00
Sharon,Pa. S3 ..... 99.50
S.Chicago R2, U5, W14 ..... 99.50
S.Duquesne,Pa. U5 ..... 99.50
S.SanFrancisco B3 ..... 109.00
Warren,O. C17 ..... 99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..... $119.00
Bridgeport,Conn. C32 ..... 119.00
Buffalo R2 ..... 119.00
Canton,O. R2, T7 ..... 119.00
Conshohocken,Pa. A3 ..... 121.00
Detroit S41 ..... 119.00
Economy,Pa. B14 ..... 119.00
Farrell,Pa. S3 ..... 119.00
Fontana,Calif. K1 ..... 140.00
Gary,Ind. U5 ..... 119.00
Houston S5 ..... 124.00
Ind.Harbor,Ind. Y1 ..... 119.00
Johnstown,Pa. B2 ..... 119.00
Lackawanna,N.Y. B2 ..... 119.00
LosAngeles B3 ..... 139.00
Lowellville,O. S3 ..... 119.00
Massillon,O. R2 ..... 119.00
Midland,Pa. C18 ..... 119.00
Munhall,Pa. U5 ..... 119.00
Owensboro,Ky. G8 ..... 119.00
Seattle(6) B3 ..... 140.00
Sharon,Pa. S3 ..... 119.00
S.Chicago R2,U5,W14 ..... 119.00
S.Duquesne,Pa. U5 ..... 119.00
Struthers,O. Y1 ..... 119.00
Warren,O. C17 ..... 119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ..... $122.50
Canton,O. R2 ..... 125.00
Cleveland R2 ..... 122.50
Gary,Ind. U5 ..... 122.50
S.Chicago,Ill. R2,W14 ..... 122.50
S.Duquesne,Pa. U5 ..... 122.50
Warren,O. C17 ..... 122.50

SKELP
Aliquippa,Pa. J5 ..... 5.05
Benwood,W.Va. W10 ..... 5.05
Ind.Harbor,Ind. Y1 ..... 5.05
Munhall,Pa. P5 ..... 5.05
Pittsburgh J5 ..... 5.05
Warren,O. R2 ..... 5.05
Youngstown R2, U5 ..... 5.05

WIRE RODS
AlabamaCity,Ala. R2 ..... 6.40
Aliquippa,Pa. J5 ..... 6.40
Alton,Ill. L1 ..... 6.60
Bartonville,Ill. K4 ..... 6.50
Buffalo W12 ..... 6.40
Cleveland A7 ..... 6.40
Donora,Pa. A7 ..... 6.40
Fairfield,Ala. T2 ..... 6.40
Houston S5 ..... 6.65
IndianaHarbor,Ind. Y1 ..... 6.40
Johnstown,Pa. B2 ..... 6.40
Joliet,Ill. A7 ..... 6.40
KansasCity,Mo. S5 ..... 6.65
Kokomo,Ind. C16 ..... 6.50
LosAngeles B3 ..... 7.20
Minnequa,Colo. C10 ..... 6.65
Monessen,Pa. P7 ..... 6.40
Pittsburg,Calif. C11 ..... 7.20
Portsmouth,O. P12 ..... 6.40
Roebling,N.J. R5 ..... 6.50
S.Chicago,Ill. R2, W14 ..... 6.40
SparrowsPoint,Md. B2 ..... 6.50
Sterling,Ill.(1) N15 ..... 6.40
Sterling,Ill. N15 ..... 6.50
Struthers,O. Y1 ..... 6.40
Worcester,Mass. A7 ..... 6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ..... 5.50
Aliquippa,Pa. J5 ..... 5.50
Atlanta A11 ..... 5.70
Bessemer,Ala. T2 ..... 5.50
Bethlehem,Pa. B2 ..... 5.55
Birmingham C15 ..... 5.50
Clairton,Pa. U5 ..... 5.50
Fairfield,Ala. T2 ..... 5.50
Fontana,Calif. K1 ..... 6.30
Gary,Ind. U5 ..... 5.50
Geneva,Utah C11 ..... 5.50
Houston S5 ..... 5.60
Ind.Harbor,Ind. I-2, Y1 ..... 5.50
Johnstown,Pa. B2 ..... 5.55
Joliet,Ill. P22 ..... 5.50
KansasCity,Mo. S5 ..... 5.60
Lackawanna,N.Y. B2 ..... 5.55
LosAngeles B3 ..... 6.20
Minnequa,Colo. C10 ..... 5.80
Munhall,Pa. U5 ..... 5.50
Niles,Calif. P1 ..... 6.25
Phoenixville,Pa. P4 ..... 5.55
Portland,Oreg. O4 ..... 6.25
Seattle B3 ..... 6.25
S.Chicago,Ill. U5, W14 ..... 5.50
S.SanFrancisco B3 ..... 6.15
Sterling,Ill. N15 ..... 5.50
Struthers,O. Y1 ..... 5.50
Torrance,Calif. C11 ..... 6.20
Weirton,W.Va. W6 ..... 5.50

Wide Flange
Bethlehem,Pa. B2 ..... 5.55
Clairton,Pa. U5 ..... 5.50
Fontana,Calif. K1 ..... 6.45
IndianaHarbor,Ind. I-2 ..... 5.50
Lackawanna,N.Y. B2 ..... 5.55
Munhall,Pa. U5 ..... 5.50
Phoenixville,Pa. P4 ..... 5.55
S.Chicago,Ill. U5 ..... 5.50
Sterling,Ill. N5 ..... 5.50
Weirton,W.Va. W6 ..... 5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Gary,Ind. U5 ..... 6.80
Houston S5 ..... 6.90
Munhall,Pa. U5 ..... 6.80
S.Chicago,Ill. U5, W14 ..... 6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 ..... 8.05
Bessemer,Ala. T2 ..... 8.05
Bethlehem,Pa. B2 ..... 8.10
Clairton,Pa. U5 ..... 8.05
Fairfield,Ala. T2 ..... 8.05
Fontana,Calif. K1 ..... 8.85
Gary,Ind. U5 ..... 8.05
Geneva,Utah C11 ..... 8.05
Houston S5 ..... 8.15
Ind.Harbor,Ind. I-2, Y1 ..... 8.05
Johnstown,Pa. B2 ..... 8.10
KansasCity,Mo. S5 ..... 8.15
Lackawanna,N.Y. B2 ..... 8.10
LosAngeles B3 ..... 8.75
Munhall,Pa. U5 ..... 8.05
Phoenixville,Pa. P4 ..... 8.10
Seattle B3 ..... 8.80
S.Chicago,Ill. U5, W14 ..... 8.05
S.SanFrancisco B3 ..... 8.70
Sterling,Ill. N15 ..... 7.75
Struthers,O. Y1 ..... 8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 ..... 8.10
Ind.Harbor,Ind. I-2 ..... 8.05
Lackawanna,N.Y. B2 ..... 8.10
Munhall,Pa. U5 ..... 8.05
S.Chicago,Ill. U5 ..... 8.05
Sterling,Ill. N15 ..... 7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ..... 5.55
Ind.Harbor,Ind. I-2 ..... 5.50
Lackawanna,N.Y. B2 ..... 5.55
Munhall,Pa. U5 ..... 5.50
S.Chicago,Ill. I-2, U5 ..... 5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ..... 6.50
Lackawanna,N.Y. B2 ..... 6.50
Munhall,Pa. U5 ..... 6.50
S.Chicago,Ill. I-2, U5 ..... 6.50
Weirton,W.Va. W6 ..... 6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..... 5.30
Aliquippa,Pa. J5 ..... 5.30
Ashland,Ky.(15) A10 ..... 5.30
Bessemer,Ala. T2 ..... 5.30
Clairton,Pa. U5 ..... 5.30
Claymont,Del. P4 ..... 5.30
Cleveland J5, R2 ..... 5.30
Coatesville,Pa. L7 ..... 5.30
Conshohocken,Pa. A3 ..... 5.30
Ecorse,Mich. G5 ..... 5.30
Fairfield,Ala. T2 ..... 5.30
Farrell,Pa. S3 ..... 5.30
Fontana,Calif.(30) K1 ..... 6.10
Gary,Ind. U5 ..... 5.30
Geneva,Utah C11 ..... 5.30
GraniteCity,Ill. G4 ..... 5.40
Houston S5 ..... 5.40
Ind.Harbor,Ind. I-2, Y1 ..... 5.30
Johnstown,Pa. B2 ..... 5.30
Lackawanna,N.Y. B2 ..... 5.30
Mansfield,O. E6 ..... 5.30
Minnequa,Colo. C10 ..... 6.15
Munhall,Pa. U5 ..... 5.30
Newport,Ky. A2 ..... 5.30
Pittsburgh J5 ..... 5.30
Riverdale,Ill. A1 ..... 5.30
Seattle B2 ..... 6.20
Sharon,Pa. S3 ..... 5.30
S.Chicago,Ill. U5, W14 ..... 5.30
SparrowsPoint,Md. B2 ..... 5.30
Sterling,Ill. N15 ..... 5.30
Steubenville,O. W10 ..... 5.30
Warren,O. R2 ..... 5.30
Youngstown U5, Y1 ..... 5.30
Youngstown(27) R2 ..... 5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 ..... 7.05
Fontana,Calif. K1 ..... 7.85
Geneva,Utah C11 ..... 7.05
Houston S5 ..... 7.15
Johnstown,Pa. B2 ..... 7.05
SparrowsPoint,Md. B2 ..... 7.05

PLATES, Wrought Iron
Economy,Pa. B14 ..... 14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 ..... 7.95
Ashland,Ky. A10 ..... 7.95
Bessemer,Ala. T2 ..... 7.95
Clairton,Pa. U5 ..... 7.95
Claymont,Del. P4 ..... 7.95
Cleveland J5, R2 ..... 7.95
Coatesville,Pa. L7 ..... 7.95
Conshohocken,Pa. A3 ..... 7.95
Economy,Pa. B14 ..... 7.95
Ecorse,Mich. G5 ..... 7.95
Fairfield,Ala. T2 ..... 7.95
Farrell,Pa. S3 ..... 7.95
Fontana,Calif.(30) K1 ..... 8.75
Gary,Ind. U5 ..... 7.95
Geneva,Utah C11 ..... 7.95
Houston S5 ..... 8.05
Ind.Harbor,Ind. I-2, Y1 ..... 7.95
Johnstown,Pa. B2 ..... 7.95
Munhall,Pa. U5 ..... 7.95
Pittsburgh J5 ..... 7.95
Seattle B3 ..... 8.85
Sharon,Pa. S3 ..... 7.95
S.Chicago,Ill. U5, W14 ..... 7.95
SparrowsPoint,Md. B2 ..... 7.95
Sterling,Ill. N15 ..... 7.625
Warren,O. R2 ..... 7.95
Youngstown U5, Y1 ..... 7.95

PLATES, Alloy
Aliquippa,Pa. J5 ..... 7.50
Claymont,Del. P4 ..... 7.50
Coatesville,Pa. L7 ..... 7.50
Economy,Pa. B14 ..... 7.50
Farrell,Pa. S3 ..... 7.50
Fontana,Calif. K1 ..... 8.30
Gary,Ind. U5 ..... 7.50
Houston S5 ..... 7.60
Ind.Harbor,Ind. Y1 ..... 7.50
Johnstown,Pa. B2 ..... 7.50
Lowellville,O. S3 ..... 7.50
Munhall,Pa. U5 ..... 7.50
Newport,Ky. A2 ..... 7.50
Pittsburgh J5 ..... 7.50
Seattle B3 ..... 8.40
Sharon,Pa. S3 ..... 7.50
S.Chicago,Ill. U5, W14 ..... 7.50
SparrowsPoint,Md. B2 ..... 7.50
Youngstown Y1 ..... 7.50

PLATES, Ingot Iron
Ashland c.l. (15) A10 ..... 5.55
Ashland l.c.l.(15) A10 ..... 6.05
Cleveland c.l. R22 ..... 6.05
Warren,O. R2 ..... 6.05

FLOOR PLATES
Cleveland J5 ..... 6.375
Claymont,Del. P4 ..... 6.375
Conshohocken,Pa. A3 ..... 6.375
Ind.Harbor, Ind. I-2 ..... 6.375
Munhall,Pa. U5 ..... 6.375
Pittsburgh J5 ..... 6.375
S.Chicago,Ill. U5 ..... 6.375

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ..... 5.675
Aliquippa,Pa.(9) J5 ..... 5.675
Alton,Ill. L1 ..... 5.875
Atlanta(9) A11 ..... 5.875
Bessemer,Ala.(9) T2 ..... 5.675
Birmingham(9) C15 ..... 5.675
Buffalo(9) R2 ..... 5.675
Canton,O.(23) R2 ..... 6.15
Clairton,Pa.(9) U5 ..... 5.675
Cleveland(9) R2 ..... 5.675
Ecorse,Mich.(9) G5 ..... 5.675
Emeryville,Calif. J7 ..... 6.425
Fairfield,Ala.(9) T2 ..... 5.675
Fairless,Pa.(9) U5 ..... 5.825
Fontana,Calif.(9) K1 ..... 6.375
Gary,Ind.(9) U5 ..... 5.675
Houston(9) S5 ..... 5.925
Ind.Harbor(9) I-2, Y1 ..... 5.675
Johnstown,Pa.(9) B2 ..... 5.675
Joliet,Ill. P2 ..... 5.675
KansasCity,Mo.(9) S5 ..... 5.925
Lackawanna(9) B2 ..... 5.675
LosAngeles(9) B3 ..... 6.375
Massillon,O.(23) R2 ..... 6.15
Midland,Pa.(23) C18 ..... 6.025
Milton,Pa. M18 ..... 5.825
Minnequa,Colo. C10 ..... 6.125
Niles,Calif. P1 ..... 6.375
Owensboro,Ky.(9) G8 ..... 6.025
Pittsburg,Calif.(9) C11 ..... 6.375
Pittsburgh(9) J5 ..... 5.675
Portland,Oreg. O4 ..... 6.425
Riverdale,Ill.(9) A1 ..... 5.675
Seattle(9) A24,B3,N15 ..... 6.425
S.Ch'c'go(9)R2,U5,W14 ..... 5.675
S.Duquesne,Pa.(9) U5 ..... 5.675
S.SanFran.,Calif.(9) B3 ..... 6.425
Sterling,Ill.(1)(9) N15 ..... 5.675
Sterling,Ill.(9) N15 ..... 5.775
Struthers,O.(9) Y1 ..... 5.675
Tonawanda,N.Y. B12 ..... 5.675
Torrance,Calif.(9) C11 ..... 6.375
Warren,O. C17 ..... 6.025
Youngstown(9) R2, U5 ..... 5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ..... 6.725
Bethlehem,Pa. B2 ..... 6.725
Bridgeport,Conn. C32 ..... 6.80
Buffalo R2 ..... 6.725
Canton,O. R2, T7 ..... 6.725
Clairton,Pa. U5 ..... 6.725
Detroit S41 ..... 6.725
Economy,Pa. B14 ..... 6.725
Ecorse,Mich. G5 ..... 6.725
Farrell,Pa. S3 ..... 6.725
Fontana,Calif. K1 ..... 7.775
Gary,Ind. U5 ..... 6.725
Houston S5 ..... 6.975
Ind.Harbor,Ind. I-2, Y1 ..... 6.725
Johnstown,Pa. B2 ..... 6.725
KansasCity,Mo. S5 ..... 6.975
Lackawanna,N.Y. B2 ..... 6.725
LosAngeles B3 ..... 7.775
Lowellville,O. S3 ..... 6.725
Massillon,O. R2 ..... 6.725
Midland,Pa. C18 ..... 6.725
Owensboro,Ky. G8 ..... 6.725
Pittsburgh J5 ..... 6.725
Seattle(6) B3 ..... 7.825
Sharon,Pa. S3 ..... 6.725
S.Chicago R2, U5, W14 ..... 6.725
S.Duquesne,Pa. U5 ..... 6.725
Struthers,O. Y1 ..... 6.725
Warren,O. C17 ..... 6.725
Youngstown U5 ..... 6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 ..... 8.30
Bessemer,Ala. T2 ..... 8.30
Bethlehem,Pa. B2 ..... 8.30
Clairton,PPa. U5 ..... 8.30
Cleveland R2 ..... 8.30
Ecorse,Mich. G5 ..... 8.30
Fairfield,Ala. T2 ..... 8.30
Fontana,Calif. K1 ..... 9.00
Gary,Ind. U5 ..... 8.30
Houston S5 ..... 8.55
Ind.Harbor,Ind. Y1 ..... 8.30
Johnstown,Pa. B2 ..... 8.30
KansasCity,Mo. S5 ..... 8.55
Lackawanna,N.Y. B2 ..... 8.30
LosAngeles B3 ..... 9.00
Pittsburgh J5 ..... 8.30
Seattle B3 ..... 9.05
S.Chicago,Ill. R2, W14 ..... 8.30
S.Duquesne,Pa. U5 ..... 8.30
S.SanFrancisco B3 ..... 9.05
Sterling,Ill. N15 ..... 7.925
Struthers,O. Y1 ..... 8.30
Youngstown U5 ..... 8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,P.(9) B2 ..... 5.825
Houston(9) S5 ..... 5.925
KansasCity,Mo.(9) S5 ..... 5.925
Lackawanna(9) B2 ..... 5.675
Sterling,Ill. N15 ..... 5.775
Sterling,Ill.(1) N15 ..... 5.675
Tonawanda,N.Y. B12 ..... 5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ..... 5.675
Atlanta A11 ..... 5.875
Joliet,Ill. P22 ..... 5.675
Minnequa,Colo. C10 ..... 6.125
Niles,Calif. P1 ..... 6.375
Pittsburgh J5 ..... 5.675
Portland,Oreg. O4 ..... 6.425
SanFrancisco S7 ..... 6.52
Seattle B3 ..... 6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 ..... 16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Gary,Ind. U5 ..... 6.80
Houston S5 ..... 7.05
KansasCity,Mo. S5 ..... 7.05
Pittsburgh J5 ..... 6.80
Youngstown U5 ..... 6.80

BARS, C.F. Leaded (Including leaded extra)
Carbon
LosAngeles P2, S30 ..... 11.75*
Alloy
Ambridge,Pa. W18 ..... 10.175
BeaverFalls,Pa. M12.. 10.175
Camden,N.J. P13 ..... 10.35
Chicago W18 ..... 10.175
Elyria,O. W8 ..... 10.175
Monaca,Pa. S17 ..... 10.175
Newark,N.J. W18 ..... 10.35
SpringCity,Pa. K3 ..... 10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ..... 7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 ..... 8.25
Buffalo B5 ..... 7.70
Camden,N.J. P13 ..... 8.10
Carnegie,Pa. C12 ..... 7.65
Chicago W18 ..... 7.65
Cleveland A7, C20 ..... 7.65
Detroit B5, H5, P17 ..... 7.85
Detroit S41 ..... 7.65
Donora,Pa. A7 ..... 7.65
Elyria,O. W8 ..... 7.65
FranklinPark,Ill. N5 ..... 7.65
Gary,Ind. R2 ..... 7.65
GreenBay,Wis. F7 ..... 7.65
Hammond,Ind. J5, L2 ..... 7.65
Hartford,Conn. R2 ..... 8.15
Harvey,Ill. B5 ..... 7.65
LosAngeles(49) S30 ..... 9.10
LosAngeles(49) P2, R2.. 9.10
Mansfield,Mass. B5 ..... 8.20
Massillon,O. R2, R8 ..... 7.65
Midland,Pa. C18 ..... 7.65
Monaca,Pa. S17 ..... 7.16
Newark,N.J. W18 ..... 8.10
NewCastle,Pa.(17) B4 ..... 7.65
Pittsburgh J5 ..... 7.65
Plymouth,Mich. P5 ..... 7.90
Putnam,Conn. W18 ..... 8.20
Readville,Mass. C14 ..... 8.20
Seattle(49) S30 ..... 9.10
S.Chicago,Ill. W14 ..... 7.65
SpringCity,Pa. K3 ..... 8.10
Struthers,O. Y1 ..... 7.65
Warren,O. C17 ..... 7.65
Waukegan,Ill. A7 ..... 7.65
Willimantic,Conn. J5 ..... 8.15
Youngstown F3, Y1 ..... 7.65

BARS, Cold-Finished Alloy (Turned and Ground)
Cumberland,Md.(5) C19 6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ..... 9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 ..... 9.025
Bridgeport,Conn. C32 ..... 9.175
Buffalo B5 ..... 9.025
Camden,N.J. P13 ..... 9.20
Canton,O. T7 ..... 9.025
Carnegie,Pa. C12 ..... 9.025
Chicago W18 ..... 9.025
Cleveland A7, C20 ..... 9.25
Detroit H5, S41 ..... 9.225
Donora,Pa. A7 ..... 9.025
Elyria,O. W8 ..... 9.025
FranklinPark, Ill. N5 ..... 9.025
Gary,Ind. R2 ..... 9.025
GreenBay,Wis. F7 ..... 9.025

Hammond,Ind. J5, L2 ..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ...9.225
S.Chicago,Ill. W14 .....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

Atlanta A11 .....5.00
Birmingham C15 .....5.25
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fontana,Calif. K1 ....6.375
Ind.Harbor,Ind. Y1 ....5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.475
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland, Oreg. O4 ....6.425
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. W14 ....5.675
S.SanFrancisco B3 ...6.425
SparrowsPoint,Md. B2 .5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 ....7.33
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 16.10
Economy,Pa.(D.R.)B14 20.50
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 20.50
McK.Rks.(S.R.) L5 ...16.10
McK.Rks.(D.R.) L5 ...20.50
McK.Rks.(DirRolled)L5 13.55

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4)(44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ...5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1 5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 .5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14 7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2 .7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 .....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2 ..6.275
Steubenville,O. W10 ....6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 .....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	....7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	....7.125	7.375
GraniteCity,Ill.G4	7.225	....
Ind.Harbor I-2	..7.225	7.425
Irvin,Pa. U5	....7.125	7.375
Kokomo,Ind. C16	.7.325	....
MartinsFry. W10	.7.125	7.375
Pitts.,Calif. C11	.7.875	....
Pittsburgh J5	....7.125	....
SparrowsPt. B2	.7.225	....
Weirton W6	....7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) 9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland (28) R2 .....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 .....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2 .6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ..6.975*
Ind.H'rb'r,Ind. I-2, Y1 6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ....6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire Div., Hoover Ball & Bearing
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
J10 Jay Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N17 National Steel Corp.
N20 Neville Ferro Alloy Co.

O1 Ohio Ferro-Alloys Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P25 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S31 Sawhill Tubular Products
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
S47 Seaway Steel Corp.

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Div., National Steel Corp.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala. (27) R2 ..5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ...5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ...5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ...5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ...8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 ....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ...8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1.7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ...7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ..5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 ....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.425
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.425
Ind.Harbor,Ind. Y1 ...7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10..7.875
NewBritain,Con. S15 ..7.875
NewCastle,Pa. B4, M23 7.425
NewHaven,Conn. D2...7.875
NewKensington,Pa. A6 7.425
Pawtucket,R.I. R3, N8 7.975
Philadelphia P24 .....7.875
Riverdale,Ill. A1 .....7.425
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975
Youngstown Y1 .....7.425
Youngstown S41 .....7.425

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Carnegie,Pa. S18 .....15.55
Cleveland A7 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 ....15.55
Pawtucket,R.I. S8 ...15.90
Riverdale,Ill. A1 ....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrel,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Sprine Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.06	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.96	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ...7.525*
McKeesport,Pa. E10 ..7.50*
NewCastle,Pa. M23 ...7.425*
Riverdale,Ill. A1 .....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41 ....7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Basis Weight 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Electrolytic (100 lb basis wt)	0.25 lb Coating
Aliquippa,Pa. J5	$9.10
Fairfield,Ala. T2	9.10
Fairless,Pa. U5	9.10
Fontana,Calif. K1	9.75
Gary,Ind. U5	9.10
GraniteCity,Ill. G4	9.20
Ind.Harb.,Ind. I-2, Y1	9.10
Irvin,Pa. U5	9.10
Niles,O. R2	9.10
Pittsburg,Calif. C11	9.75
SparrowsPt.,Md. B2	9.10
Weirton,W.Va. W6	9.10
Yorkville,O. W10	9.10

ELECTRO. TIN-COATED SHEET

(20-27 gage; per 100 lb)

IndianaHarb.,Ind. Y1 ..$7.90

(21-27 gage; per 100 lb)

Aliquippa,Pa. J5 .....$7.90
Niles,O. R2 .....7.90

TIN PLATE, HOT DIPPED COMMON COKE	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$8.20
Fairfield,Ala. T2 .....8.20
Fairless,Pa. U5 .....8.20
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.20
GraniteCity,Ill. G4 .....8.30
Ind.Harbor,Ind. I-2, Y1.8.20
Irvin,Pa. U5 .....8.20
Niles,O. R2 .....8.20
Pittsburg,Calif. C11 ....8.85
SparrowsPoint,Md. B2 ..8.20
Weirton,W.Va. W6 .....8.20
Yorkville,O. W10 .....8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5 .....7.85
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 .....7.95
Ind.Harbor,Ind. Y1 ....7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	....	9.975*11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	....	9.875*11.20*	11.90*	13.05*	....
Mansfield,O. E6	....	9.875*11.70	12.40	13.55	14.65
Newport,Ky. A2	....	9.875 11.70*	12.40*	13.55*	14.65*
Niles,O. M21	....	9.875*11.70	12.40	13.55	....
Vandergrift,Pa. U5	....	9.875*11.70	12.40	13.55	14.65
Warren,O. R2	....	9.875*11.70	12.40	13.55	14.65
Zanesville,O. A10	....	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
Beech Bottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 ....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 ....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 ....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ...8.25
Monessen,Pa. P7, P16 ..8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ...8.95
Portsmouth,O. P12 ....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ...8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ...8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2 ..12.65
KansasCity,Mo. U3 ...12.90
LosAngeles(2) B3 ....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ..12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 ....12.95
SparrowsPt.,Md.(10)B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.95
Palmer,Mass. W12 ....10.06
Pittsburg,Calif. C11 ..10.075
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.06
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.06
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 ....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.20
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.20
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 ....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.06
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ...16.65
Johnstown,Pa. B2 ....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ...16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Pittsburg,Calif. C11 ...13.45
Palmer,Mass. W12 ....16.60
S.SanFrancisco C10 ...17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 ....13.45
Buffalo W12 .....13.45
Fostoria,O. S41 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 ....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ....13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb net box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	9.02
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	9.02
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	8.02
Pittsburg,Calif. C11	9.20
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	9.30
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	9.30
Kokomo,Ind. C16	9.16
LosAngeles B3	9.50
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.50
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	9.35
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	9.35
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.55
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass. W12	19.10	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½Ga. J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality

6 to 8 gage	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.85	19.90
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55
Houston(48) S5	9.25	9.80**
Jack'vill,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9 00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

FASTENERS

SCREWS, NUTS, BOLTS

(Consumer discounts per cent off list prices, plain finishes. For less than full container quantities, add 25 per cent; attaching nuts to bolts in sizes ¼ in. through ⅝ in. diameter through 8 in. in length, price on application. Discounts are determined by the quantity of screws, nuts, and bolts ordered for one destination at one time.)

Base, one keg	43.00
20,000 lb or more	53.00

SCREWS, SETSCREWS

Hex Screws and High Strength Hex Screws, through 1 in. x 12 in.:

Base, one keg	43.00
20,000 lb or more	53.00

Hex Screws 1⅛ in. diameter and larger: See net price schedule.

Fillister Head Screws, coarse thread:

Packages	+70.00
Bulk	+28.00

Flat Head Screws, coarse thread:

Packages	+100.00
Bulk	+52.00

Setscrews, Square Head, Cup-point, coarse thread:

Packages	+10.00
Bulk	15.00

(Bulk discounts on fillister, flat head, and set screws apply only to products ordered in these minimum quantities: ¼ in. through ⅝ in. diameter, 15,000 pieces; ¾ in. through ⅞ in. diameter, 5000 pieces; and 1 in. diameter, 2000 pieces.)

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in. larger 12.85
7/16 in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St. Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1⅝	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

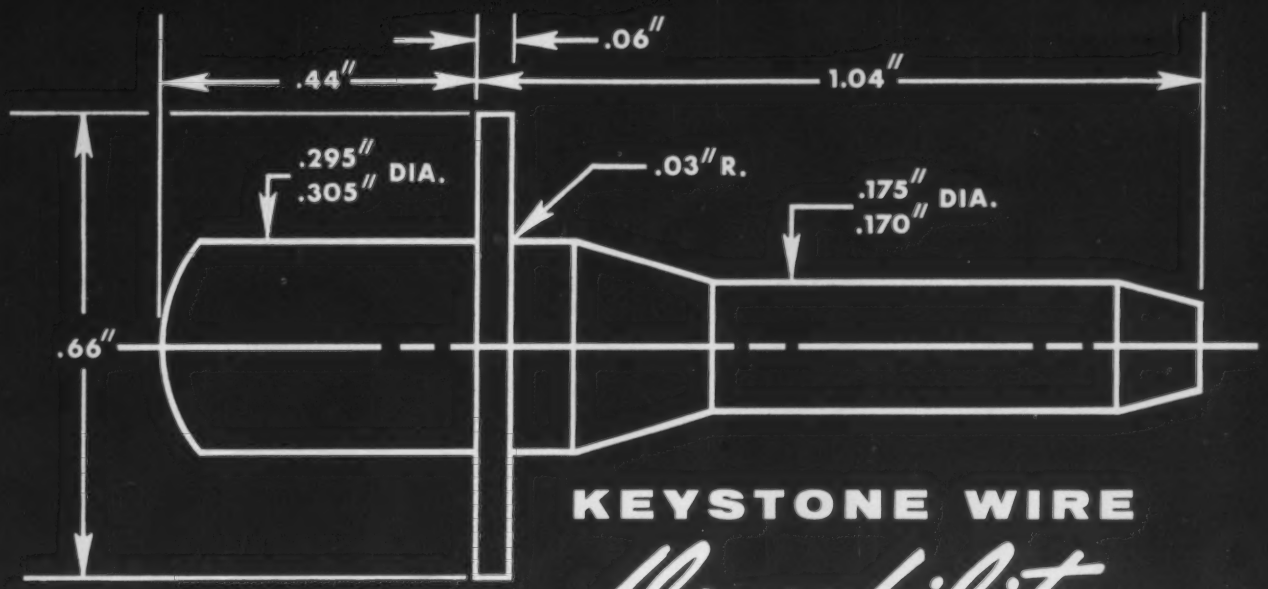
Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.



KEYSTONE WIRE *flowability*

ELCO

3 TIMES ACTUAL SIZE

makes possible

- **64% wire reduction**
- **Large thin collar**
- **Low-cost production**

for Elco Tool and Screw Corporation

To cold head a plunger-selector lever, vital part in an automobile shift mechanism, is a four-blow operation successfully done by Elco Tool and Screw Corporation, Rockford, Illinois. Rigid specifications call for a 64% wire reduction from the original .306″ diameter wire. They also designate forming a .660″ diameter collar while holding a section of the plunger shaft to a 15° ±0° 30′.

Dean Tollefsrud, Purchasing Agent for Elco, reports, "We have had excellent results from Keystone Steel & Wire Company C-1038 Special Process Wire in making this plunger." Adds Louie Zanin, Process Engineer, "Production runs and die life have been good for this difficult heading job. We have been successful in forming this part even though specifications are critical."

Keystone's Research and Metallurgical departments have developed special thermal treatments and closely controlled manufacturing procedures to insure uniform temper and structure throughout each coil. So, when your specifications call for major extrusions and severe upsetting, remember the flowability characteristics of Keystone Wire. If you desire, long continuous coils are available. We shall be glad to help you solve your wire problems. Write us for further details.

Keystone Steel & Wire Company, Peoria, Illinois

KEYSTONE

WIRE FOR INDUSTRY

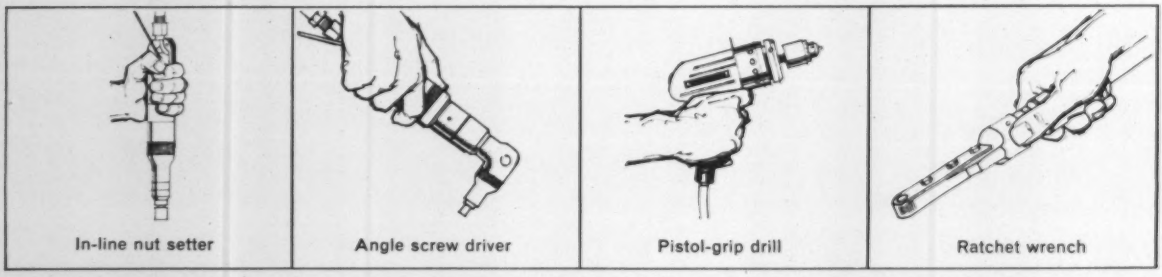
MANUFACTURED AT PEORIA, ILLINOIS, U. S. A.

Getting the most from the hands you hire

In tight places as shown above, or where elbow-room is plentiful, Gardner-Denver can provide exactly the right air tool to keep expensive hands working at top efficiency.

Each air motor size provides the basic "building block" for hundreds of different tools—assuring versatility and interchangeability to keep pace with production changes.

For details, see your Gardner-Denver air tool specialist or write for bulletins.



In-line nut setter | Angle screw driver | Pistol-grip drill | Ratchet wrench

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois—Offices in principal U.S., Canadian and Mexican cities

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SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
380	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Phoenix Steel Corp.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloy Steel Co., Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: Carbon Base 5%	10%	15%	20%	Sheets: Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malle-able	Besse-mer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Chicago I-3 (Phos. 0.075% max)	71.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Phos. 0.075% max)	71.00
Erie, Pa. I-3 (Phos. 0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.50	10.26	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	9.45	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.13	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.75	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.31	9.68
Detroit	9.48	10.46	10.50	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8.67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	7.91	11.57
Indianapolis	9.66	10.64	10.57	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.27	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.57	10.55	11.05	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.54	12.37	10.05	13.25	16.40	10.35	9.79	11.82
New York	10.07	10.78	11.35	12.37	10.44	13.25	16.40	10.90	10.22	11.82
Philadelphia	9.50	10.00	10.66	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	9.22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	10.51	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	9.57	10.24	11.39	11.74	9.57	11.49	16.54	9.92	9.41	11.70
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.20	17.85	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $175.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, $163; E. Chicago, Ind., Joliet, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Aisey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W. Va., Freeport, Vanport, Merrill Station, Clearfield, Pa., Wellsville, Irondale, New Salisbury, Ohio, $100; Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $250; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup Tex., Fords, N. J., Philadelphia, $365.

Tar Bonded Brick (per ton)

Dolomite: Nario, Ohio, $87.50. Dolomite-Magnesite: Nario, Ohio, $109.50. Magnetite: Nario, Ohio, $128.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ⅝ in. grains bulk, Luning, Nev., $46; ⅝ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$15.75-16.25*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75
48% no ratio	24.00-26.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$3.00-3.50
60-65%	3.60-4.00

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Inches Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:

Carbon (N.T.):

Forging $97.00

Rerolling 78.00

Alloy (N.T.) 115.00

Wire Rods:

Carbon 5.70

Alloy 6.40

Wire (carload lots):

Merchant annealed . 8.40

Low carbon indus. . 7.20

Upholstery spring .. 8.55

M.B. spring 8.85

Bars & Small Shapes:

Carbon, merchant .. 5.30

Carbon, special 5.85

Alloy 6.40

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $29-$29.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	7.50††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	27.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe.	36.75, ton deld. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh) ...	58.0
Carbonyl Iron:	
90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.80
Bronze powder, 90/10.	56.80
Copper, all types	15.00*
Lead	7.50*
Manganese, 500 lb and up	25.00*
Nickel, all types ...	0.78-1.06
Nickel-Silver	56.00
Solder	7.00*
Stainless Steel, 304 ...	89.00
Stainless Steel, 316 ...	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20

	Dollars
Cobalt:	
98.5%, minus 100-300 mesh ..	1.57-1.58
99.5%, below 5 microns	2.32
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa. furnace	$14.75-15.25
Connellsville, Pa. foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.75
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305 ...	$5.65	$5.70	$5.60	$5.50	$5.80
Bar Size Angles	5.85	5.90	5.80	5.70	6.00
Structural Angles	5.75	5.80	5.70	5.60	5.90
I-Beams	5.65	5.70	5.60	5.50	5.80
Channels	5.75	5.80	5.70	5.60	5.90
Plates (basic bessemer)	5.45	5.50	5.40	5.30	5.60
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	23.90	23.95	23.85	23.55	25.30
Barbed Wire (†)	6.25	6.30	6.20	6.10	6.40
Merchant Bars	5.95	6.00	5.90	5.80	6.10
Hot-Rolled Bands	5.95	6.00	5.90	5.80	6.10
Wire Rods, Thomas No. 5 (Niederrhein)	5.80*	5.90	5.75	5.75	6.00
Wire Rods, O.H., No. 5 (Niederrhein)	6.00*	6.10	5.95	5.95	6.20
Bright Common Wire Nails (§)	7.35	7.40	7.30	7.20	7.50

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier. *Except Boston.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot of 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16%, deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.27, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5-7%, Si 4-6%, S 0.03% max, 20.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max, Si 1.0% max, S 0.03%, 21.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome: (Simplex) Cr 63-66% or 68-71%: C 0.025% max, 31.50c; C 0.010% max, 32.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%; C 0.25% max, 33.00c. Cr 65-71%; C 0.05% max, 32.00c; C 0.10% max, 31.75c; C 0.20% max, 31.50c; C 0.50% max, 31.25c; C 1.0% max, 31.00c; C 1.5%, 30.75c; C 2.0% max, 30.50c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25 max). 8M x D, carload, bulk, 20.05c per lb of alloy, carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 22.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 22.50c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ¼" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 13.5c per lb contained Si. Packed, c.l. 16.0c, ton lot 17.45c, less ton 19.1c f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $2.45 per lb (all quantities) of contained W. Delivered.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.60 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l., packed 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

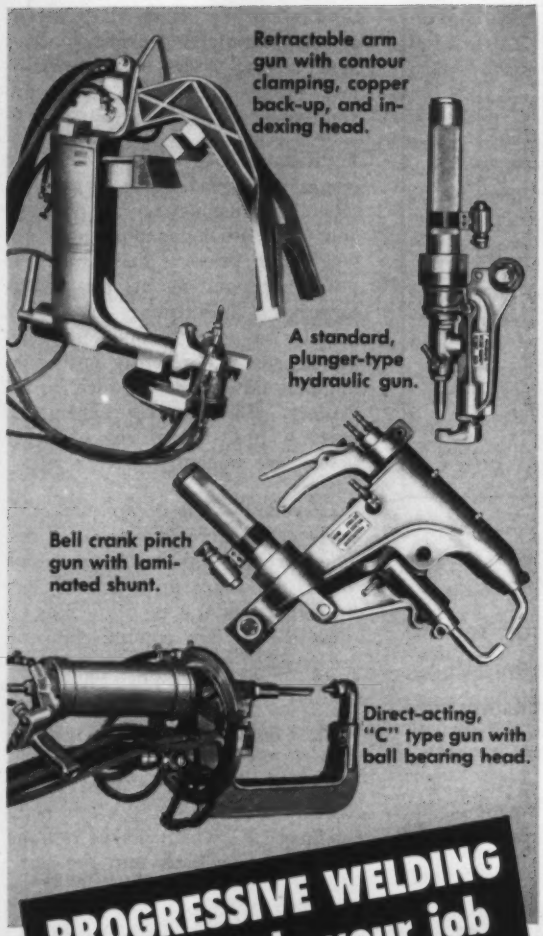
V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-70%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.89 in all sizes except powdered which is $1.95.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.60; in bags, $1.59, f.o.b. Langeloth and Washington, Pa.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Direct-acting, "C" type gun with ball bearing head.

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INTERNATIONAL

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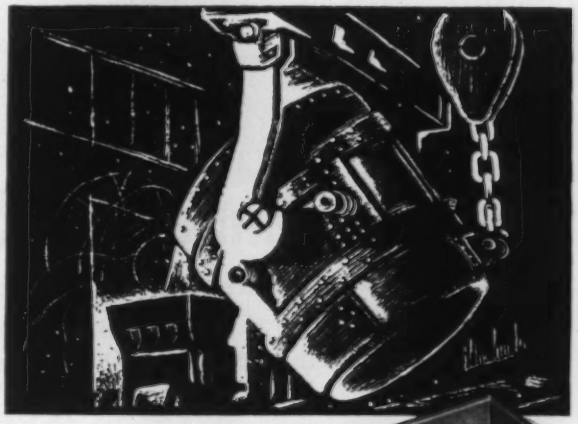

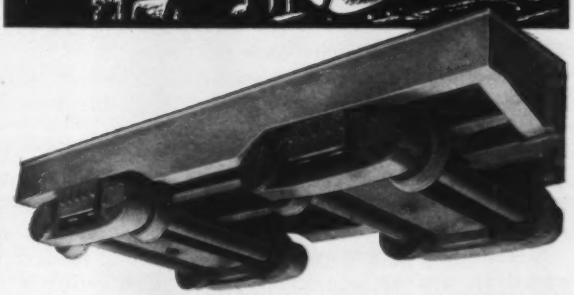

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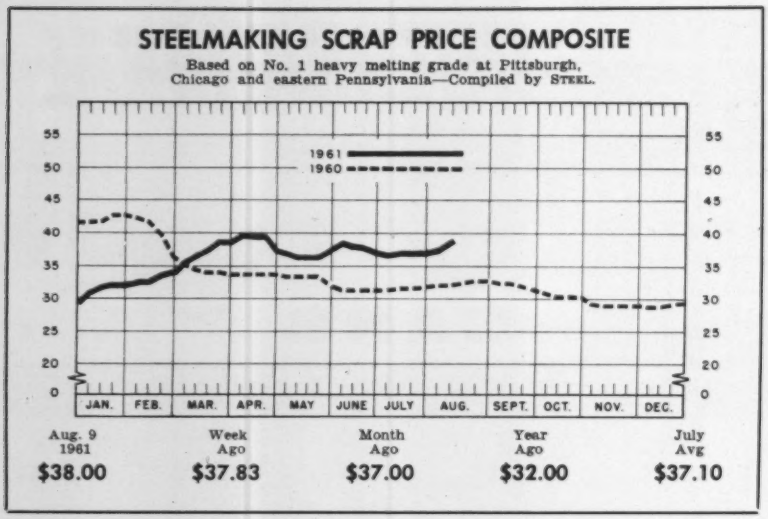

Scrap Continues to Rise

Composite on No. 1 heavy melting advances for second week, reaching $38 a ton and highest level since mid-June. Strength is attributed to prospects for heavier consumption

Scrap Prices, Page 198

● **Chicago** — The firmer tone in scrap continues with a few important steelmaking grades rising $1 a ton on limited mill purchases. Among these are No. 1 dealer heavy melting ($38), No. 2 heavy melting ($33), and No. 1 railroad heavy melting ($42).

Steelmaking operations are expected to turn up significantly in September and to continue the upward trend through the remainder of the year. Increased scrap consumption would result. Tempering the bullish outlook is the fact that supply of blast furnace hot metal is plentiful with only 27 of the district's 43 blast furnaces running.

Improved foundry demand for scrap has boosted prices of several grades $1 to $2 a ton.

● **Philadelphia**—Scrap buying by domestic consumers is a shade more active than it was. With export trading holding better than anticipated earlier in the summer, prices are steady. The only price change recorded last week was an advance in couplers, springs, and wheels to $45, delivered.

● **New York**—A good balance between supply and demand is sustaining the market on most grades of scrap at unchanged levels. Brokers' buying prices on 18-8 stainless sheets, clips, and solids are stronger at $160.

● **Pittsburgh** — With steelmaking operations gradually improving, sellers are feeling more optimistic and some are inclined to hold out for higher prices. The upturn is purely speculative at this stage, however. A consumer of No. 2 bundles has asked its suppliers to delay shipment of recently purchased material until it can reduce its inventory. B&O specialties are up 85 cents a ton, but prices of other grades are unchanged.

● **Cleveland**—The scrap market is fairly active here at current prices. The market is firm, but brokers look for no important price change over the balance of this month. Bids on railroad lists are coming out and are expected to be at about the same levels as they were a month ago.

● **St. Louis**—New buying interest in 5 ft, No. 1, heavy railroad melting scrap brought the price of this item up $2.50 to $38.50 a ton. Scullin Steel Co., which makes railroad castings, came back into the scrap market.

Dealers are more optimistic over prospect of better prices because of reduced rail freight and barge rates.

● **Buffalo**—A firmer tone in some scrap centers within shipping disance of Buffalo is tending to provide support for the local scrap market despite a lack of mill buying. Dealers are confident they will get new scrap orders in Sep-

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tember. A couple of smaller mills may take limited tonnages this month.

• **Youngstown**—Little change is expected in the scrap market here, following placement of a new order by an important Valley steel producer at $41 for No. 1 heavy melting industrial scrap.

• **Cincinnati**—The scrap market is showing a stronger price tone with dealers shipping against a local mill's orders. While an area mill is out of the market, it is anticipated the mill will be back for scrap next month, and prices may go higher. Collections of yard and industrial scrap are lagging due to metalworking plant vacations.

Birmingham — Supply of steel scrap is adequate here to meet current demands. No. 2 bundles are up $1.50 a ton to $22.50-$23.50, while bar crops and plate are down $1 a ton to $42-$43. No. 1 railroad heavy melting is up $1 a ton to $39-$40.

Supply of cast iron grades is somewhat short with No. 1 cupola $1 a ton higher at $42-$43.

• **Houston** — Scrap prices are unchanged in quiet trading. Mill and export requirements are evenly matched. Intake is seasonally slow. Brokers and consumers predict a stable market through August. Cast markets continue sluggish.

• **Los Angeles** — Export demand here is down to a trickle. The Japanese are shifting to East Coast yards where they can get lower prices. If domestic mill consumption does not improve, brokers may be forced to reduce prices to stimulate export orders. Inventories are low.

• **San Francisco**—A summer lull in the steel scrap market is evident. Exports are moving out in moderate volume. Local mills remain out of the market.

• **Portland, Oreg.**—Prices are holding steady in the scrap market here and are expected to remain stable through August. The local mill is buying as requirements develop. Additional export cargoes are scheduled for dispatch to Japan this month. Some weakness has developed in the cast iron market, No. 1 cupola dropping $1 a ton to $41.

• **Seattle** — The scrap market is strong here due to a scarcity of the better grades coupled with active export demand. One leading interest is paying $46 to $47 a ton for No. 1 heavy melting.

• **Tacoma, Wash.**—Demand for export grades is strong but for cast iron grades it's weak. A leading exporter says prices are up $1 to $2 a ton to $46 for No. 1 heavy melting, $43 for No. 2 heavy melting, and $32 for No. 2 bundles. Quotations on cast iron scrap are down generally about $2.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 193

Bethlehem Steel Co. lighted on Aug. 1 its rebuilt No. 2 coke oven battery at its Sparrows Point, Md., plant. It marks the first time that the plant has had 12 coke oven batteries in operation at the same time.

It will take more than a month to heat the ovens to proper coking temperatures, and the production of coke will not start until early October.

The No. 2 coke oven battery consists of 60 ovens, each capable of holding 18 tons of crushed coal for reduction into coke. At normal rates, Sparrows Point consumes 15,000 tons of coal in its coke ovens daily.

Pig Iron . . .

Pig Iron Prices, Page 192

Bethlehem Steel Co. put its "J" blast furnace at the Sparrows Point, Md., plant back in operation on July 31. It had been down for relining.

The furnace was altered and improved so that it may be operated with a turboblower at higher top pressures with an expected increase in efficiency.

In addition to the blowing in of the Chester, Pa., stack of Phoenix Bridge Corp. early this month, resumption of blast furnace operations at Colorado Fuel & Iron Corp.,'s Birdsboro, Pa., plant is expected late this month.

U. S. Steel Corp. idled No. 6 blast furnace at Gary, Ind., Aug. 1 because its output is not needed. That leaves 8 of 12 active at that mill. At South Works, South Chicago, Ill., 5 of 11 are running. Of the 43 blast furnaces in the Chicago district, 27 are in production.

Demand for merchant iron from foundries continues on the light side, but a seasonal pickup is noted from the July low when many foundries were closed for vacations. A further improvement after Labor Day is anticipated.

Iron producers are able to operate at less than capacity and still serve all needs of domestic users as well as those of foreign consumers.

Chemical Grade Iron Powder Offered by Micro

Micro Metals Corp., Passaic, N. J., has started full scale, continuous production of chemical grade iron powder. Using patented designs and special pulverizing mills, the company can mechanically produce metal powders in a wide range of particle sizes. Chemical grade metal powders are used as catalysts and reagents in the chemical, mining, and metal industries.

Shipments of Metal Containers Increase

Movement of steel shipping barrels and drums in May totaled 2,810,812 units, 11 per cent above shipments in April and 3 per cent above those in May 1960, says the Bureau of Census. Cumulative total for the first five months was 12,747,801 units compared with 12,429,884 in the corresponding period of last year.

Shipments of steel pails in April totaled 7,096,949 units, up 9 per cent from April and 7 per cent from May 1960. Movement during the first five months aggregated 30,821,810 units, against 30,737,566 in the same period last year.

Electrodes . . .

Wah Chang Corp., New York, reduced the price of tungsten electrodes, effective as of July 1. This is the first revision announced since Nov. 1, 1956.

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Aug. 9, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Aug. 9	$38.00
Aug. 2	37.83
July Avg.	37.10
Aug. 1960	32.33
Aug. 1956	57.13

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	*29.00-30.00*
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	23.00-24.00
No. 1 busheling	35.00-36.00
No. 1 factory bundles	46.00-47.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Short turnings	19.00-20.00
Cast iron borings	18.00-19.00
Cut structurals:	
2 ft and under	42.00-43.00
3 ft and under	39.00-40.00
Heavy turnings	27.00-28.00
Punching & plate scrap	43.00-44.00
Electric furnace bundles	43.00-44.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	34.00-35.00
Stove plate	34.00-35.00
Unstripped motor blocks	24.00-25.00
Clean auto cast	35.00-36.00
Drop broken machinery	45.00-46.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	*41.00-42.00*
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Random rails	45.00-46.00
Angles, splice bars	44.00-45.00
Railroad specialties	45.00-46.00
Rails, rerolling	59.00-60.00

Stainless Steel Scrap

18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	85.00-90.00
410 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	39.00-40.00
No. 1 hvy melt., dealer	*37.00-38.00*
No. 2 hvy melting	*32.00-33.00*
No. 1 factory bundles	42.00-43.00
No. 1 dealer bundles	38.00-39.00
No. 2 bundles	22.00-23.00
No. 1 busheling, indus.	39.00-40.00
No. 1 busheling, dealer	*37.00-38.00*
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	*44.00-45.00*
Punchings & plate scrap	44.00-45.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Stove plate	37.00-38.00
Unstripped motor blocks	33.00-34.00
Clean auto cast	47.00-48.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	*41.00-42.00*
R.R. malleable	47.00-48.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Angles, splice bars	*46.00-47.00*
Axles	56.00-57.00
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles, solids	185.00-190.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	31.00-32.00
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	37.00-38.00
No. 1 machinery	44.00-45.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Railroad specialties	41.00-42.00
Rails, rerolling	63.50-64.50

CLEVELAND

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	24.00-25.00†
No. 1 factory bundles	42.00-43.00
No. 1 bundles	35.00-36.00
No. 2 bundles	23.00-24.00†
No. 1 busheling	35.00-36.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	30.00-33.00
Cut structurals, plate, 2 ft and under	41.00-42.00
Low phos, punchings & plate	37.00-38.00
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	37.00-38.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	47.00-48.00
Burnt cast	32.00-33.00
Drop broken machinery	48.00-49.00

Railroad Scrap

R.R. malleable	47.00-48.00
Rails, 2 ft and under	48.00-49.00
Rails, random lengths	44.00-45.00
Rails, 18 in. and under	49.00-50.00
Cast Steel	41.00-42.00
No. 1 railroad cast	48.00-49.00
Railroad specialties	43.00-44.00
Angles, splice bars	44.00-45.00
Rails, rerolling	55.00-56.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	160.00-165.00
18-8 turnings	95.00-100.00
430 clips, bundles, solids	80.00-85.00
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	25.00-26.00†
No. 1 busheling	39.00-40.00
No. 1 bundles	40.00-41.00
No. 2 bundles	25.00-26.00†
Machine shop turnings	14.00-15.00†
Shovel turnings	19.00-20.00†
Cast iron borings	19.00-20.00†
Low phos.	41.00-42.00
Electric furnace bundles	41.00-42.00

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	28.00-29.00
No. 1 bundles	34.00-35.00
No. 2 bundles	20.50-21.50
No. 1 busheling	33.00-34.00
Machine shop turnings	9.00-10.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00
Cast iron borings	11.00-12.00
Low phos. 18 in.	40.00-41.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
Rails, 18 in. and under	47.00-48.00
Rails, random lengths	41.00-42.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	34.00
No. 2 heavy melting	29.00
No. 1 bundles	35.00
No. 2 bundles	24.00
No. 1 busheling	34.00
Machine shop turnings	13.50
Shovel turnings	*17.00*

Cast Iron Grades

No. 1 cupola	37.00
Charging box cast	34.00
Heavy breakable cast	32.00
Unstripped motor blocks	34.00
Clean auto cast	38.00
Stove plate	33.00

Railroad Scrap

No. 1 R.R. heavy melt.	*38.50*
Rails, random lengths	39.00
Rails, rerolling	55.00
Rails, 18 in. and under	44.00†
Angles, splice bars	40.00†

PHILADELPHIA

No. 1 heavy melting	40.00
No. 2 heavy melting	35.00
No. 1 bundles	43.00
No. 2 bundles	24.00-26.00
No. 1 busheling	43.00
Electric furnace bundles	44.00
Mixed borings, turnings	17.00†
Shovel turnings	20.00
Machine shop turnings	14.00
Heavy turnings	25.00†
Structurals & plates	44.00-46.00
Couplers, springs, wheels	*45.00*
Rail crops, 2 ft & under	51.00-53.00

Cast Iron Grades

No. 1 cupola	40.00
Heavy breakable cast	40.00
Drop broken machinery	49.00-50.00†
Malleable	49.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	4.50-5.00†
Mixed borings, turnings	5.00-5.50†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	34.00-35.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	*160.00*
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	35.00-36.00
No. 2 bundles	23.00-24.00
No. 1 busheling	31.00-32.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00

Cast Iron Grades

No. 1 cupola	32.00-33.00
Mixed cast	30.00-31.00
Stove plate	27.00-28.00
Heavy breakable	26.00-27.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	39.00-40.00

Stainless Steel Scrap

18-8 bundles & solids	170.00-175.00
18-8 turnings	70.00-75.00
430 bundles & solids	70.00-75.00
430 turnings	11.00-12.00

BIRMINGHAM

No. 1 heavy melting	37.50-38.50
No. 2 heavy melting	29.00-30.00
No. 1 bundles	37.50-38.50
No. 2 bundles	*22.50-23.50*
No. 1 busheling	38.00-39.00
Cast iron borings	10.00-11.00
Machine shop turnings	18.00-19.00
Shovel turnings	20.00-21.00
Bar crops and plate	*42.00-43.00*
Structurals & plate	42.00-43.00
Electric furnace bundles	38.00-39.00
Electric furnace:	
3 ft and under	36.00-37.00
2 ft and under	37.00-38.00

Cast Iron Grades

No. 1 cupola	*42.00-43.00*
Stove plate	42.00-43.00
Unstripped motor blocks	31.00-32.00
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	*39.00-40.00*
Rails, 2 ft and under	46.00-47.00
Rails, random lengths	41.00-42.00
Angles, splice bars	44.00-45.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	35.00
No. 2 heavy melting	31.00-32.00
No. 1 bundles	35.00-36.00
No. 2 bundles	21.00-22.00
Machine shop turnings	10.00-11.00
Low phos. plate & structurals:	
3 ft	38.00-39.00
2 ft and under	43.00-44.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Heavy breakable	26.00-27.00
Foundry malleable	30.00-31.00
Unstripped motor blocks	31.00-32.00

Railroad Scrap

R.R. heavy melt. (3 ft)	37.00-38.00

LOS ANGELES

No. 1 heavy melting	40.00-41.00
No. 1 hvy melt (export)	42.00-44.00
No. 2 heavy melting	37.00-39.00
No. 2 hvy melt (export)	41.00
No. 1 bundles	34.00-35.00
No. 2 bundles	26.00-28.00
No. 2 bundles (export)	28.00-30.00
Machine shop turnings	15.00-17.00
Shovel turnings	15.00-17.00
Cast iron borings	16.00-17.00
Electric furnace scrap	50.00

Cast Iron Grades

No. 1 cupola	44.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	43.00-45.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	41.00-42.00
No. 2 bundles	31.00
Shovel turnings	18.00
Electric furnace	54.00

Cast Iron Grades

No. 1 cupola	*41.00*
Heavy breakable	38.00
Unstripped motor blocks	39.00
Stove plate (f.o.b. plant)	37.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	*46.00*
No. 1 hvy (unprepared)	*41.00*
No. 2 heavy melting	*43.00*
No. 2 hvy (unprepared)	*38.00*
No. 2 bundles	*32.00*
Shovel turnings	16.00-18.00
Electric furnace	52.00

Cast Iron Grades

No. 1 cupola	*41.00*
Heavy breakable cast	*38.00*
Stove plate (f.o.b. plant)	*36.00*
Unstripped motor blocks	*37.00*

SAN FRANCISCO

No. 1 heavy melting	43.00**
No. 2 heavy melting	40.00**
No. 1 bundles	34.00**
No. 2 bundles	28.00**
Machine shop turnings	18.00
Mixed borings, turnings	18.00
Cast iron borings	18.00
Heavy turnings	18.00
Shovel turnings	18.00

Cast Iron Grades

No. 1 cupola	46.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	31.00
No. 2 hvy melt, 2 ft & under	30.00
No. 1 bundles	31.00
No. 2 bundles	23.50
Mixed steel scrap	23.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	31.00
Unprepared	25.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

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JFK Held to Implied Lead-Zinc Pledge

Nonferrous Metal Prices, Pages 202 & 203

A FULL-SCALE BATTLE over lead and zinc legislation may be shaping up. If President Kennedy doesn't throw his support behind what Western legislators consider an adequate subsidy-tariff program (or come up with an acceptable alternative), there could be trouble.

Westerners, including some leading Democrats, are irked by what they consider Mr. Kennedy's about-face toward the problems of the domestic mining industry and the cavalier treatment accorded some congressmen by highly placed Presidential appointees. They know they can't get a major lead-zinc bill through Congress without active administration support, and they're holding Mr. Kennedy to his implied campaign pledge to extend it.

Many Considerations

During his campaign, Mr. Kennedy hinted he would favor aid to the lead-zinc industry. The administration's present attitude is perhaps best summed up by testimony of witnesses at hearings late last month before the Senate Interior Committee on a bill sponsored by Sen. Clinton P. Anderson (D., N. Mex.). The bill calls for sharply increased tariffs and subsidy payments on the first 2000 tons of each metal produced.

Administration's Viewpoint

Speaking for the administration, W. Michael Blumenthal, deputy assistant secretary of state for economic affairs, made these objections to the bill: 1. "In the present serious and possibly critical state of world affairs, the U. S. cannot afford to take unilateral actions which may cause injury to other countries in the Free World." 2. "Passage of this legislation would seriously undermine the efforts of this country to improve relations with Latin America through the Alliance for Progress." 3. "The imposition of increased tariffs and other restrictions on imports of lead and zinc would tend to diminish the capacity of other countries to buy U. S. products."

That theme was echoed by John M. Kelly, assistant secretary-mineral resources, Department of the Interior, who suggested a watered down version of the Edmondson Bill (subsidies for small producers) rather than tariffs as a temporary measure which the administration would support. For a long range solution, Mr. Kelly mentioned: Assisting small mines to become economic producers, co-operative international approaches, a review of the tax structure affecting minerals, and task forces to study the problem.

Small Mines May Get Aid

Hope is growing that a middle ground can be found for aid to small producers, somewhere between the administration's proposal and the Edmondson Bill (sponsored by Rep. Ed Edmondson, D., Okla.). The House Interior Subcommittee has approved legislation calling for a four year subsidy program for small producers (those whose combined output of lead and zinc is 3000 tons or less a year). The plan would pay 75 per cent of the difference between the average monthly price and 14.50 cents a pound for lead and 55 per cent of the difference between the average monthly price and 14.50 cents a pound for zinc. Payments would be limited to 1500 tons the first year, and would scale down to 600 tons the fourth year.

Observers believe the bill has a pretty fair chance of passage and Presidential approval. But there's no enthusiasm in the administration for a substantial lead-zinc program. Chances are slight that any of the other bills could win approval this session.

Other Bills Pending

Rep. Wayne Aspinall (D., Colo.), chairman of the powerful House Interior Committee, has introduced a bill that calls for stabilization payments and a sliding scale of increased tariffs on imports of the two metals. Under present circumstances, Mr. Aspinall told STEEL, the only way the lead-zinc industry can be aided is through an import duty and small, direct subsidies to help small producers.

"I'm advised," he says, "that the formula in our bill will not hurt consumers, and in the long run, (won't hurt) importers. It will give the market the stability that will keep mines open and skilled miners working . . . and help areas that

NONFERROUS PRICE RECORD

	Aug. 9 Price	Last Change	Previous Price	July Avg	June Avg	Aug., 1960 Avg
Aluminum	26.00	Dec. 17, 1959	24.70	26.000	26.000	26.000
Copper	31.00	May 19, 1961	30.50	31.000	31.000	33.000
Lead	10.80	Dec. 13, 1960	11.80	10.800	10.800	11.800
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	81.25	June 30, 1961	74.00	81.250	74.277	74.000
Tin	117.50	Aug. 8, 1961	117.00	116.266	114.625	102.815
Zinc	11.50	Jan. 9, 1961	12.000	11.500	11.500	13.000

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, East St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingot, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig, 99.8%, Velasco, Tex.

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STEELECTOR PROGRAM

ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country

Nonferrous Metals

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PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 29.00; No. 356, 26.80. 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, $3.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $40 per lb and up nom.

Copper: Electrolytic, 31.00 deld; custom smelters, 31.00 nom; lake, 31.00 deld; fire refined, 30.75 deld.

Germanium: Purified, ingots, less than 1 kg 37.50 per gram; 1-10 kg 32.00 per gram; 10 kg or more, 29.95 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld; 24-99 lb, $9.50; 100-449 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $188-191 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 81.25; 10-lb pigs, unpacked, 89.00; "XX" nickel shot, 88.75; "F" nickel shot for addition to cast iron, in kegs, 81.75; "F" nickel, 5 lb ingots, 82.75. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.09; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 77.50.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $5.25 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 117.50.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.25.

Zinc: Prime Western, 11.50; brass special 11.70; intermediate, 11.70, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.35; special high grade, 12.50 deld. Diecasting alloy ingot No. 3, 13.75; No. 2, 14.25; No. 5, 14.00 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $7.25-7.75 per lb; 100-500 lb, $6.75-7.25 per lb; 500-1000 lb, $6.25-6.75; over 1000 lb, $6.25 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.25-26.00; No. 12 foundry alloy (No. 2 grade), 21.75-22.25; 5% silicon alloy, 0.60 Cu max, 23.50-24.00; 13 alloy, 0.60 Cu max, 23.50-24.00; 195 alloy, 24.75-25.75; 108 alloy, 22.25-22.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.25; grade 2, 22.00; grade 3, 21.00; grade 4, 20.00.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.955, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $11.00-16.00; H.R. strip, $11.00-15.00; C.R. strip, $13.00-18.00; forged or H.R. bars, $11.00-15.00.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	147	126	145
Strip, C.R.	133	114	145
Plate, H.R.	134	116	133
Rod, Shapes, H.R.	116	95	116
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.183	24-72	72-180	45.40-48.00
0.183-0.154	24-72	72-180	45.40-48.00
0.154-0.120	24-72	72-180	45.90-48.80
0.120-0.096	24-72	72-180	45.90-48.80
0.096-0.076	24-72	72-180	46.40-50.30
0.076-0.060	24-72	72-180	46.90-51.10
0.060-0.047	24-72	72-180	47.40-52.30
0.047-0.037	24-72	72-180	47.90-53.70
0.037-0.030	24-72	72-180	48.40-55.30
0.030-0.023	24-60	72-180	48.90-57.10
0.023-0.018	24-48	72-144	49.40-57.40
0.018-0.014	24-48	72-144	51.20-58.00
0.014-0.011	24-48	72-144	53.50-60.00
0.011-0.0085	24-36	72-96	56.20
0.0085-0.007	24-36	72-96	59.20
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates: 1100, 3003, and 5005, mill finish, 0, H12, and H14 tempers, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
3.000-2.000	6-144	72-240	46.10-51.00
2.000-1.251	6-144	72-240	46.50-51.30
1.251-0.751	6-144	72-240	45.50-50.60
0.751-0.250	6-144	72-240	45.50-50.60

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.50-24.00; No. 2 heavy copper and wire, 22.75-23.25; light copper 20.00-20.50; No. 1 composition red brass, 20.50-21.00; No. 1

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES d (Based on copper at 31.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	56.13b	50.36-51.36	....	57.32	27.00	27.00	26.25
Yellow Brass	49.27	35.77c	49.56	53.43	20.375	19.50c	18.50c
Low Brass, 80%	52.15	52.09	52.44	56.21	22.875	22.625	22.125
Red Brass, 85%	53.17	53.11	53.46	57.23	23.875	23.625	23.125
Com. Bronze, 90%	54.73	54.67	55.02	58.54	24.75	24.50	24.00
Manganese Bronze	57.69	51.27	61.54	....	19.25	19.00	18.50
Muntz Metal	51.94	47.25	....	....	19.125	18.875	18.375
Naval Brass	53.94	47.75	60.25	58.10	19.00	18.75	18.25
Silicon Bronze	61.39	60.58	60.68	79.80	26.50	26.25	25.75
Nickel Silver, 10%	65.56	67.16	66.91	....	26.00	25.75	13.00
Phos. Bronze, A-5%	76.97	77.47	76.72	78.90	28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 19.50-20.00; new brass clipping, 18.00-18.50; light brass, 15.00-15.50; heavy yellow brass, 15.00-15.50; new brass rod ends, 17.00-17.50; auto radiators, unsweated, 16.50-17.00; cocks and faucets, 17.25-17.75; brass pipe, 17.50-18.00.

Lead: Soft scrap lead, 7.25-7.50; battery plates, 3.00-3.25; linotype and stereotype, 8.50-8.75; electrotype, 8.00-8.25; mixed babbitt, 10.00-10.50.

Monel: Clippings, 26.00-26.50; old sheets, 25.00-25.50; turnings, 18.50-19.00; rods, 25.00-25.50.

Nickel: Sheets and clips, 56.00-58.00; rolled anodes, 56.00-58.00; turnings, 43.00; rod ends, 56.00-58.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.50; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 4.00-4.50; segregated low copper clips, 10.75-11.25; segregated high copper clips, 9.75-10.25; mixed low copper clips, 10.25-10.75; mixed high copper clips, 9.75-10.25.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 9.50-10.00; clean borings and turnings, 7.00-7.50; segregated low copper clips, 14.50-15.00; segregated high copper clips, 13.00-13.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.50; clean borings and turnings, 8.50-9.00; segregated low copper clips, 13.50; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50-13.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 28.25; No. 2 heavy copper and wire, 26.00; light copper, 23.75; refinery brass (60% copper) dry copper content, 24.75.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 28.00; No. 2 heavy copper and wire, 26.00; light copper, 23.75; No. 1 composition borings, 23.00-24.00; No. 1 composition solids, 23.50-24.50; heavy yellow brass solids, 18.50; yellow brass turnings, 17.50; radiators, 19.50-20.50.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 117.50; 500-1999 lb, 110.50; 2000-4999 lb, 107.00; 5000-29,999 lb, 106.00; 30,000 lb, 105.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 135.50; 200-499 lb, 134.00; 500-999 lb, 133.50; 1000 lb or more, 133.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.25, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5900 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 47.50; 200 lb, 45.50; 300 lb, 44.50; 400-4900 lb, 42.50; 500-9900 lb, 40.50; 10,000 lb or more, 39.50.

Nickel Sulphate: 5000-22,999 lb, 31.00; 23,000-39,900 lb, 30.50; 40,000 lb or more, 30.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 86.90; 100-600 lb, 77.20; 700-1900 lb, 74.50; 2000-9900 lb, 72.60; 10,000 lb or more, 71.30.

Stannous Chloride (Anhydrous): 100 lb, 145.40; 400 lb, 135.40; 800-19,900 lb, 114.10; 20,000 lb or more, 109.90.

Stannous Sulphate: Less than 50 lb, 152.80; 50 lb, 122.80; 100-1900 lb, 120.80; 2000 lb or more, 118.80.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

are depressed."

Mr. Aspinall concedes that his bill has only a slight chance without active support from President Kennedy. Right now it doesn't look like such help will be forthcoming.

Mr. Edmondson sums up how strongly many congressmen felt about this question: "The case against reciprocal trade right now is lead and zinc. This industry will have to show substantial signs of recovery or it will be a rallying cry for opponents of reciprocal trade." Observers believe the same statement is true of foreign aid.

Finished Steel Shipments Rise Further in June

Finished steel shipments in the first half reached 31,337,998 tons, says the American Iron & Steel Institute, New York. The total was 27.1 per cent less than the 42,853,937 tons shipped during the first six months of 1960, but it was 2,932,717 tons above the figure for the last six months of 1960.

Shipments of 6,133,519 tons during June, 1961, were 1.4 per cent higher than the 6,047,691 tons shipped in May of this year and 3.6 per cent higher than the 5,920,860 tons shipped in June, 1960.

Shipments (tons) of principal products during the first half of 1961 compared with those of the two, six-month periods of 1960:

Products Shipped	1st 6 Mo 1961	2nd 6 Mo 1960	1st 6 Mo 1960
Sheets:			
Cold rolled ..	5,544,670	5,765,983	8,700,278
Hot rolled ...	3,249,569	3,046,298	4,944,450
Bars, hot rolled (includ. lgt. shapes)	2,929,711	2,610,081	4,305,354
Plates	2,696,325	2,260,636	3,870,951
Electro. Tin Plate	2,881,987	2,110,684	2,964,818
Shapes, heavy	2,075,012	1,887,840	2,947,992
Markets			
Automotive ..	5,563,008	6,013,784	8,602,882
Distributors ..	5,784,266	4,766,431	7,727,046
Construction (including maintenance)	4,410,168	4,096,906	5,583,713
Containers ...	3,516,650	2,575,110	3,853,013
Machinery, etc.	1,782,932	1,418,209	2,538,590

Wire . . .

Wire Prices, Pages 187 &188

Wire products are under little pressure and, in general, supplies are readily available for prompt delivery. Merchant wire is still available from stock; manufacturers' wire can be had within one to five weeks, depending upon the product.

Distributors . . .

Prices, Page 192

Steel service centers report little improvement in business during the last three or four weeks. Nevertheless, they expect August sales to be up slightly from those in July and anticipate further improvement in September.

An important distributor in Chicago says that his July business did not fall off as much as had been expected. Bookings aggregated 98 per cent of what had been projected, and the month's volume fell only 2 to 3 per cent below June's, despite widespread closings of metalworking plants for vacations. Indications are that this distributor's business volume in 1961 will be 10 to 11 per cent ahead of 1960's.

Structurals haven't come up to distributors' expectations. The explanation: Fabricators won't pay service center prices when they are able to get quick delivery from mills. Another weak product is bars. Reason: There are numerous small mills which accept small orders and give fast delivery.

The price situation remains keenly competitive in most districts. In the Southwest, one leading distributor says the profit margin is extremely thin and that the industry needs a 10 to 15 per cent pickup in business before any real stability will be possible. The major reason for the low price schedules in that district is the pressure from imported steel.

Prices on galvanized sheets have been reduced in several districts, including Chicago, Detroit, Indianapolis, Milwaukee, and St. Louis.

CLASSIFIED

Representatives Wanted

MANUFACTURING REPRESENTATIVE WANTED in Ohio and Pennsylvania by steel fabricating plant in Cleveland area with background in miscellaneous iron, structural, and plate fabrication. Commission basis. Write giving complete resume to Box 955, STEEL, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED RATES

All classifications other than "Position Wanted" set solid, 50 words or less $20.00, each additional word, .40; all capitals, 50 words or less $23.00, each additional word .50; all capitals leaded, 50 words or less $28.00, each additional word .65. "Position Wanted" set solid, 25 words or less $5.50, each additional word .22; all capitals 25 words or less $7.50, each additional word .29; all capitals leaded 25 words or less $9.00, each additional word .35. Keyed address takes seven words. Cash with order necessary on "Position Wanted" advertisements. Replies forwarded without charge. Displayed classified rates on request. Address your copy and instructions to STEEL, Penton Building, Cleveland 13, Ohio.

SUNBEAM electric heater cases get uniform finish with RANSBURG electrostatic. . . . 6 times as many per gallon of paint—15 times faster.

"Paint Mileage Leaps 500%.... Production Upped 15 Times" Reports ENAMELED STEEL & SIGN CO.

Curt Simmons, President, ENAMELED STEEL & SIGN COMPANY of Chicago, describes results with RANSBURG Automatic No. 2 Process Electro-Spray: "We first painted cases for the new SUNBEAM portable electric heaters with air hand spray at the rate of 200 pieces per day using 6 gallons of paint. Now, with RANSBURG electrostatic we've increased production 1400% to 3000 pieces daily with only 15 gallons of paint." An increase of 500% in paint mileage! *What would savings like this mean in your finishing department?*

QUALITY IMPROVED WITH RANSBURG ELECTRO-SPRAY

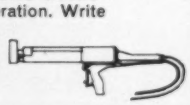
Sags and runs, a problem with the air hand spray, have been eliminated with the automatic electrostatic equipment. Mr. Simmons adds: "Now we achieve a uniformity over the configurated area which wasn't always possible before. We know the 50,000th piece will turn out the same as the first."

ENAMELED STEEL—sold on the efficiency and versatility of RANSBURG Electro-Spray—uses 14 automatic No. 2 Process units to meet the heavy demands of their diversified, high volume production.

NO REASON WHY YOU CAN'T DO IT TOO

Manufacturers—large and small—are reporting similar savings in paint and labor with increased production. If your volume doesn't justify automatic electrostatic equipment, perhaps the RANSBURG electrostatic hand gun will help cut costs in your finishing operation. Write for our new brochure showing actual in-plant production photos, savings figures and detailed information on RANSBURG No. 2 Process Electro-Spray.

RANSBURG



RANSBURG Electro-Coating Corp.

Box 23122, Indianapolis 23, Indiana

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Automation Makes More Jobs

COMING IN

Sept. 4

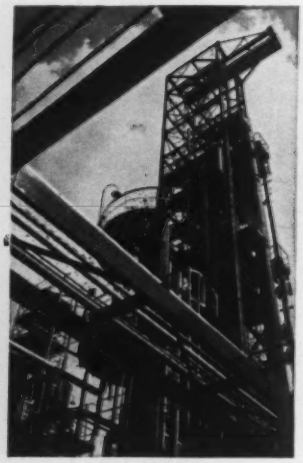
STEEL

Automation is America's biggest job maker, not the ominous threat to employment that union leaders and others claim. So, to create more jobs, we need more automation, not less.

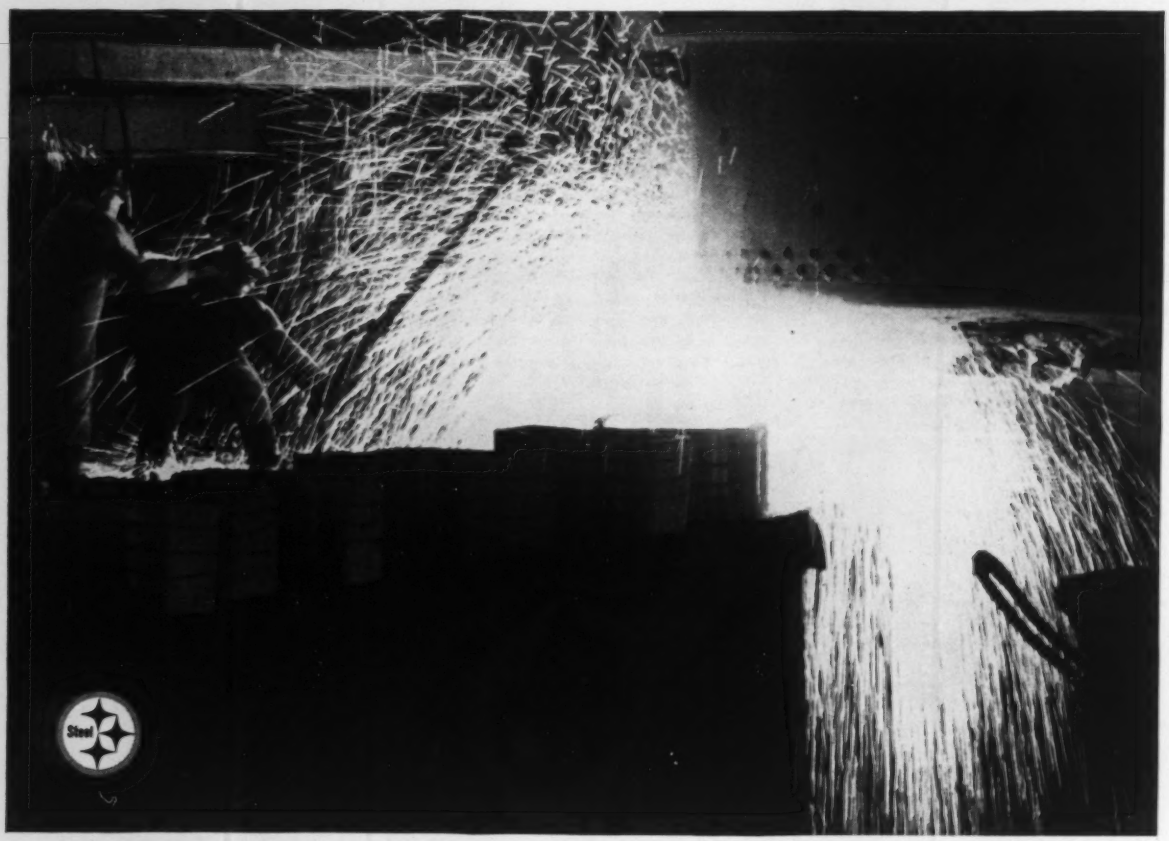
That's the thesis of STEEL's next impact issue, Sept. 4. A team of ten editors has been working on the special report since May. The regular format for the issue will be discarded, and we'll bring you a 40-page survey in depth on automation and its effects on jobs.

The Sept. 4 study will be STEEL's fourth Impact Issue, a new kind of business paper reporting.

Capacity for quality quickly . . .



Alan Wood has several decided advantages to offer users of steel plate, sheet and strip. Capacity for quality quickly is one of them. Another is dependable product performance stemming from meticulous quality control. And our "immediate-attention-to-orders" policy adds still another *plus* when you do business with Alan Wood.



***that's* YOUR ADVANTAGE *at* ALAN WOOD STEEL COMPANY**

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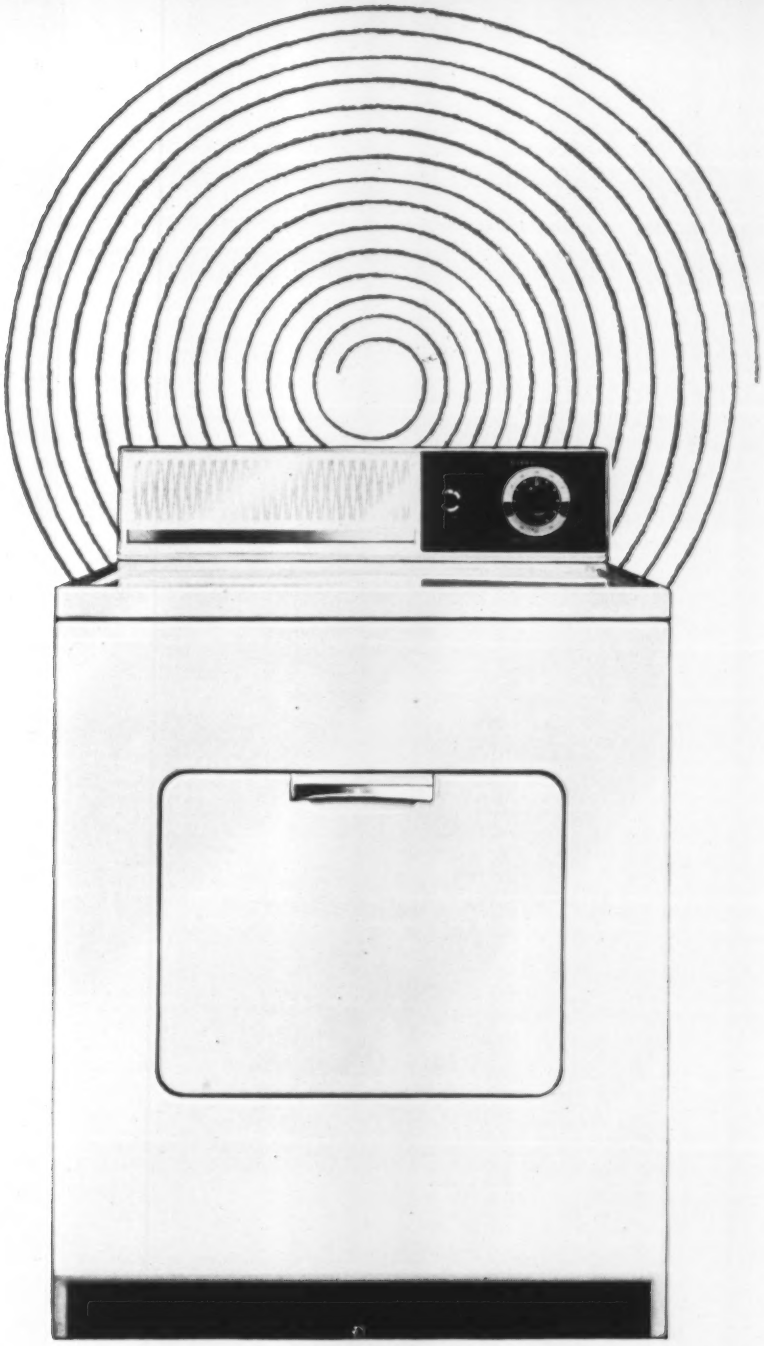

OPEN UP: for modern enameling sheet

Open up the steel coil and subject it to controlled gases, and you can produce commercial quantities of "direct-on" enameling steel from regular rimmed steel sheet. Here's an economic edge for both producer and user. Steelmakers no longer need supply low metalloid steels which are expensive to melt and roll, and the enameler can eliminate one of the two steps in his processing. To get all the details on this revolutionary new Open Coil Process of Gas Alloying write for Bulletin OC-960, *Lee Wilson Engineering Co., Inc., 20005 Lake Road, Cleveland 16, Ohio.*

Lee Wilson

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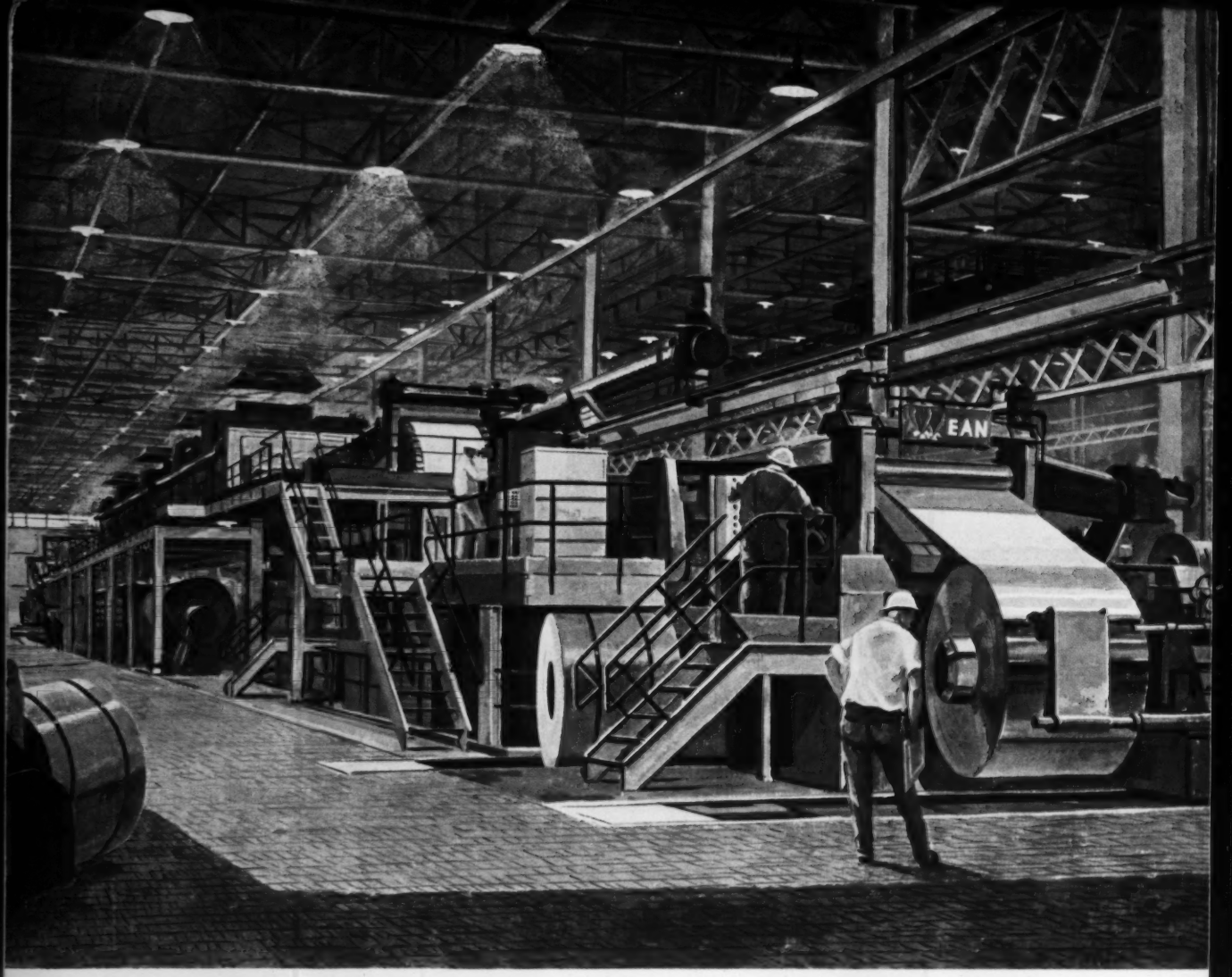

PORTRAIT OF PROGRESS: *Wean Annealing and Pickling Line at Armco Steel Corporation's Butler Works*

Wean Line Part of Armco's Expansion into Wider, Closer Tolerance Stainless

Over the past ten years, Armco Steel Corporation has carried on a multi-million dollar expansion and modernization of its Butler, Pennsylvania plant facilities. One of the latest projects boosts the plant's production of flat-rolled stainless steel, providing customers with wider, closer tolerance stainless sheet and coils.

A vital part of this program is represented by the Wean stainless annealing and pickling line illustrated. This line is unique, in that all processing sections are installed above floor level. Above-ground design facilitates inspection and maintenance of the furnace section, acid tanks, and drive mechanisms.

Armco's new Wean line is capable of handling 30,000-pound stainless steel coils from 24" to 52" in width and from .010" to .080" in thickness. The line operates at speeds up to 150 feet per minute. An even flow of materials is maintained in the processing section by two pay-off reels that permit rapid joining of coils.

The Wean "creative engineering" that resulted in these new design features has also been part of the development of annealing facilities for every major steel producer. This background of research and development is ready to help you solve your production and modernization problems.

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO